## About Datasheet view

Datasheet view provides an Excel-like environment for viewing and editing data. It displays the contents of a list or a document library in a grid of rows and columns. Items and columns in the list appear as rows and columns in Datasheet view. You can add and edit rows and columns, apply filters and sort orders, display calculated values and totals, and more.

The following illustration shows the Employee list in Datasheet view:

-A row corresponds to a list item.
2A column corresponds to a list field.
sThe triangle in the column header is used to filter and sort data.
4The Total row is used to display aggregate values for each column.

- Software requirements for working with Datasheet view
- Support for Datasheet view
- Parts of a list in Datasheet view


## About software requirements for Datasheet view

To open a list in Datasheet view, you must meet the following requirements:
Install Microsoft Office Professional Edition 2003 on your computer. Install the Microsoft Office List Datasheet Component that is included with Office 2003 on your computer.

Note This component is installed by default when you install Office 2003. Use Microsoft Internet Explorer 5.01 with Service Pack 2 (SP2) or later to open the list.

Make sure security settings in the browser support Microsoft ActiveX controls.

If one or more of the above requirements are not met, you will see a message indicating that the list will be displayed in Standard view. The settings you specified for the Datasheet view, such as column order, sorting and filtering, and Total row settings, will be applied to the Standard view before the list is displayed. However, settings such as row height, column width and hidden columns, will be ignored.

Note that even if you do not meet all of the above requirements, you will be able to make changes to the Datasheet view. The changes will be saved, and you will be able to see the effect of your changes the next time you use a computer that meets all the software requirements listed above.

## Get help in Datasheet view

To get help on Datasheet view, right-click any cell inside the Datasheet view, and click Help.

Important The Datasheet view Help topics only cover functionality that is available in Datasheet view. For general assistance with Microsoft Windows SharePoint Services lists, click Help on the page toolbar.

To get help on the SharePoint page containing the Datasheet view, click Help on the page toolbar.

To get help when a List Vew Web Part is displayed in Datasheet view, click the Web Part menu, and click Help. The Help topics cover Web Part Pages, Web Part properties, and Web Part connections.

## Notes

Several dialog boxes and status bar text include links to context-sensitive help information. You can also click Help (@) on the task pane toolbar.

If the Datasheet view is in focus, pressing F1 will display help on Datasheet view. Otherwise, it will display Internet Explorer Help.

## Display product and computer information in Datasheet view

You can display the version of the Microsoft Office List Datasheet Component that is installed on your computer, the product ID number, system information, and other related information by opening the About dialog box.

Right-click the top-left corner of the list, and click About.

## Troubleshoot Datasheet view

- I cannot open a list in Datasheet view, or the list opens in Standard view.
- I don't see any or only some data in the view.
- I get the message "Cannot connect to the server."
- I get the message "List/view does not exist."
- I get the message "You do not have permissions."
- I get the message "Attachments cannot be displayed or added."
* I get the message "Unable to refresh the list."
, I get the message "Required fields are missing from the view."
- The view or parts of it is read-only.


## About customizing Datasheet view in FrontPage

You can make changes to a Datasheet view from the Edit Datasheet View page. The Edit Datasheet View page lets you make basic changes to the view, such as specify a different name for the view, change column settings, change the sort order and filter criteria, and so on.

If you want to further customize your page, open the view in Microsoft Office FrontPage 2003. FrontPage offers you advanced options to customize the appearance and layout of a view. In addition to the choices offered by the Edit Datasheet View page, you can do the following:

Add images to the page
Apply themes to the page
Edit the text contained in the page
Customize the view toolbar
When a view is opened in FrontPage, it appears disabled and does not support any interactions. You cannot make changes to the data in the view, refresh the view, or make structural changes, such as add or delete a column.

## FrontPage views

You can use one of the three FrontPage views to customize a Datasheet view: Design, Preview, or Code. Each view offers unique functionality, and makes it easier for you to design a view that suits your needs.

Design view When you click the Edit with Microsoft FrontPage button on the Standard Buttons toolbar in Internet Explorer, the view opens in FrontPage Design view.

To customize a Datasheet view, the list must be opened in Datasheet view prior to clicking the Edit button. Note that if you open a list in Standard view, then click the Edit in Datasheet button on the view toolbar prior to clicking the Edit button on the browser, the Standard view will open in FrontPage.

In Design view, you make changes to the view. When you make a change, FrontPage updates the view. For example, when you specify a filter criteria, FrontPage applies the new criteria and refreshes the view.
Preview When you switch to Preview, you can preview the changes you have made to the view, and see how the view and the page containing the view will look in Internet Explorer. The list cannot connect to the server, so only limited functionality is available in this view.

Code view If you want to make changes to the view programmatically, switch to Code view. In this view, you can add or modify code contained in the page. When you switch from Code view to Design view, FrontPage will attempt to refresh the view. If the code has one or more errors, FrontPage will notify you of the same.

## Ways to customize a view in FrontPage

Change column settings You can specify the columns that should be included in the view, and the column order.

Change sort order You can include multiple columns in the sort order. You can specify the order of the fields, and for each field, the sort direction. For example, you can sort the view in ascending order of the Last Name column, and within each last name, sort the rows in descending order of the Designation column.

Change filter settings You can specify a simple filter condition, such as Last Name equals Smith, or specify a complex filter criteria that includes multiple filter clauses and the AND and OR operators.

Change Total row settings You can show or hide the Total row in the Datasheet view. Note that you will not be able to change the aggregate function that is used to calculate the total for each column.

Change the view You can change the type of view from Datasheet view to Standard view or Calendar view.

Customize the view toolbar You can choose a full toolbar or a summary toolbar. Based on the view type, the full toolbar displays all applicable buttons. A summary toolbar will display the name of the list and the button to add a new item, row, or document.

Customize the page containing the view You can add or edit text surrounding the view, add images, change the page's background color, and add or change themes. For more information on how to customize a page, see FrontPage Help.

## About applying a theme to a Datasheet view

A theme is a set of unified design elements and color schemes for bullets, fonts, horizontal lines, background images, and other Datasheet view elements. A theme helps you to easily create professional and welldesigned Datasheet views.

Here is the order in which the view retrieves theming information for its elements:

Microsoft Windows SharePoint Services page style sheet
By default, the Datasheet view will inherit the theme that is applied to the Microsoft Windows SharePoint Services page that contains the view.

Microsoft Internet Explorer settings
Note Text size and color settings for links specified in Internet Explorer will not affect the Datasheet view.

Microsoft Windows System Display settings
Note When you change the theme settings in Internet Explorer or Windows, the view does not get updated until you refresh the view.

You can also apply themes to a view by opening it in Microsoft Office FrontPage 2003. For more information, see FrontPage Help.

## Make Datasheet view the default view

1. Under Actions, click Modify settings and columns.
2. Scroll to the bottom of the page, and under Views click the name of the Datasheet view that you want to make the default.
3. In the Edit Datasheet View page, under the Name section, select the Make this the default view check box.

Note If the view is already set as the default view, or if it is set as a personal view, you will not see the check box.

## Show, hide, or resize the task pane

To show or hide the task pane, click Task Pane on the toolbar.
To resize the task pane, position the cursor over the Net Shade bar to the left of the pane. When the cursor changes to a resize cursor, click and drag to the left or right.

## Keyboard shortcuts for working in Datasheet view

You can use shortcut keys for quick access to frequently used commands or operations. The topics below list the shortcut keys available in the Datasheet view. You can also use access keys to move focus to different parts of the view without using the mouse.

- Select parts of the view
- Carry out commands
- Edit data
- Format a cell that supports rich HTML text
- Sort and filter data


## About improving Datasheet view performance

The performance of a Datasheet view depends on many factors, such as the size of the list, performance and configuration of the server, and network conditions. This topic lists a few guidelines for improving view performance.

The following operations might take some time to complete, so keep them to the minimum:

Refreshing a view that contains a large amount of data.
Moving or copying large sets of data.
Filling large numbers of cells by dragging the fill handle.
Changing the formula in a calculated column.
Attaching large documents.
Exporting from and linking to Microsoft Office Excel.
Resolving large numbers of errors.
Do the following to improve performance of a view:
Remove unnecessary columns from the view. In the Edit Datasheet View page, clear the Display check box for columns that are not necessary in the view. But do not remove columns that are marked Required. You will not be able to add data if the view does not include all required columns.

Apply one or more filters to remove rows that are not necessary. For example, you could edit the definition of the Managers view to include a filter that hides rows of employeers who are not managers.

In addition to saved filters, you could apply filters during a session to further reduce the amount of data in the view. For example, if you are currently updating rows of managers in Washington, hide the rows of managers from other states.

Configure the SharePoint server to improve performance. For more information on improving server performance, see Microsoft Windows SharePoint Services Help. To display Windows SharePoint Services

Help, click Help on the page toolbar.

## How does Datasheet view retrieve and update data?

Use Datasheet view to edit data, because it is faster than editing data in Standard view.

In Standard view, you edit one item at a time. You cannot edit the next item unless the previous item is sent to the server and committed.

In Datasheet view, you can make changes to a row, and then move on to the next row and start editing the cells in that row. The view takes care of sending your changes to the server and communicating the status back to you, without disrupting your work.

## Asynchronous updates

When you add or edit a row, the view sends the change to the server, marks the row as pending, and displays the Pending ( $\rightleftarrows$ ) icon in the row header. When a row has pending changes, you cannot edit the row until the changes are committed. But you can continue editing other rows while the last set of changes are being sent to the server.

When the view gets a response from the server, it updates the row accordingly. If the edit resulted in a conflict or error, the row header shows the Conflict ( ${ }^{*}$ ) icon or the Error ( $\$$ ) icon. If the edit was successfully committed, the Pending icon is removed, and the row is made available for editing.

Changes to the view definition, such as changing the order of columns or hiding the Total row, are also sent to the server asynchronously. However, you cannot make structural changes or edit a calculated column when there are pending changes. You must wait for all changes to commit and resolve any resulting conflicts or errors before changing the structure or editing a calculated column.

If you attempt to refresh or move away from the view when there are pending changes, you will be prompted to wait until all of your changes are committed. Based on the server response, you will then be able to resolve any conflicts or errors.

## Asynchronous data retrieval

When you open a list in Datasheet view, it retrieves the first 100 rows, and retrieves the rest asynchronously. The status bar displays Retrieving data when the view is still fetching data from the server. If you attempt to filter or sort data, you will have to wait until the list completes retrieving all the necessary data from the server to see the result of the filtering or sorting.

If the server is busy, not found, or if any other error occurs that prevents the view from retrieving the necessary rows, the view will display an error.

## Select a cell, row, column, or list in Datasheet view

- Select a single cell
- Select the contents of a cell
- Select a range of cells
- Select a row or column
- Select multiple rows or columns


## Add a row or column in Datasheet view

- Add a row
- Add a column


## Modify a column in Datasheet view

You can change a column's name, description, and data type, or settings related to its data type.

1. Right-click a cell in the column that you want to modify, and then click Edit/Delete Column.
2. On the Change Column page, make the changes, and click OK.

## Notes

You can modify only one column at a time. If cells in multiple columns are selected, the column containing the active cell will be taken as the selected column.

If a column is read-only, you cannot modify it.

## Rearrange columns in Datasheet view

Datasheet view offers a quick and easy way to change the order of columns.

1. To move a column, place the mouse pointer on the header of the column that you want to move until you see the move ( $\ddagger+$ ) pointer.

To move a range of columns, click the header of the first column, then keeping the SHIFT key pressed, click the last column in the range. Place the pointer on one of the sides of the rectangle that covers the selected columns to display the move pointer.
2. Click and drag selection to the new location.

When you move a column, the view definition gets automatically updated.
Note You cannot move rows. You can rearrange rows by sorting them.

## Troubleshoot dragging and dropping data

- I cannot move a row.
- I cannot drag and drop data in Datasheet view.
- When I drop data, the view displays an error message.


## Show or hide a column in Datasheet view

- Show a hidden column
- Hide a column


## Delete a row or column in Datasheet view

- Delete a row
- Delete a column


## Change column width in Datasheet view

1. Right-click the column header, and click Column Width.
2. In the Column Width dialog box, type a number between 1 and 255.

## Notes

If you specify 0 as the width, the column will appear hidden.
You can also drag the boundary on the right side of the column header until the column is the width you want. To size a column so that the contents of each cell fit in a single line, move the cursor to the right boundary of the column header. When the resizing cursor appears, double-click the boundary line.

## Change row height in Datasheet view

1. Right-click a row header, and click Row Height.
2. In the Row Height dialog box, type a number between 1 and 409.

## Notes

Changing the height of a row changes the height of all rows in the list.
You can also drag the top or bottom boundary of the row header until the row is the height you want. To size a row so that the contents are fully visible, move the cursor to the bottom boundary of the row header. When the resizing cursor appears, double-click the boundary line.

## About data types

For help on data types, see Microsoft Windows SharePoint Services Help.

To display Windows SharePoint Services Help, click Help on the page toolbar.

## Troubleshoot data types

For help with troubleshooting problems related to data types, see Microsoft Windows SharePoint Services Help.

To display Windows SharePoint Services Help, click Help on the page toolbar.

## Specify a default value for a column in Datasheet view

You can specify a default value for columns of type single-line, choice, number, currency, or date and time. The default value will be shown automatically in the column for all new rows. You can leave the default value in the cell, or edit it any time.

1. Right-click a column, and click Edit/Delete Column.
2. Under Default Value, select one of the following:

- Text If the column type is Single line of text, specify a string as the default value.
- Choice If the column type is Choice, specify one of the choices from the list of choices you specified above.
- Number If the column type is Number, specify a numeric value.
- Currency If the column type is Currency, specify a currency value.
- Today's Date If the column type is Date and time, and you want the default value to be the current date, select this option.
- Any date If the column type is Date and time, and you want to specify a specific date, select the last option button, and enter a date in MM/DD/YYYY format.
- Yes in the Default value box If the column type is Yes/No (check box), and you want the check box to appear selected by default, select Yes.
- Calculated If you want to use a calculated value as the default value, enter a formula. Note that the formula cannot reference other columns in the list.


## Add, edit, or delete cell contents in Datasheet view

- Make changes one cell at a time
, Bulk edit cells


## Edit a hyperlink in Datasheet view

This command is available only if the selected cell has a hyperlink.

1. Right-click the cell that has a hyperlink, point to Hyperlink, then click Edit Hyperlink.
2. In the Edit Hyperlink dialog box, type a valid URL in the Web address text box. A valid URL must begin with a protocol, such as http:// or ftp://, and must not exceed 255 characters.
3. Type the display text in the Description text box.

## Enter data in a cell by selecting from a list of values in Datasheet view

You can pick a value from a list for columns of type single line of text.
As you start typing in a cell, a drop-down list appears below or above the current cell. The list displays all existing values in the column that begin with what you have typed in the current cell.

For example, if you type $\mathbf{W}$ in row 5 of the State column, you see a dropdown list that displays all values that begin with W that you have already typed in the State column.


To see a complete list of values specified in the current column, right-click a blank cell in the column, and click Pick from List.

## Undo changes in Datasheet view

You can undo changes that have not yet been saved to the list. When in edit mode, you can undo changes made to the current cell. After exiting edit mode, you can undo the last n changes made to entire cells.

Click Undo on the task pane toolbar.

## Notes

For cells that support rich HTML formatting, each formatting command is considered an edit.

The Undo command is different from canceling edit mode by pressing Esc.

You can't undo changes to the list after you add or remove an attachment from a record. You can't undo changes to a row after the row has been saved.

## Validate data

For help on validating data, see Microsoft Windows SharePoint Services Help.

To display Windows SharePoint Services Help, click Help on the page toolbar.

## Get notified when contents of a list are modified

- Receive notification when one of the following is changed: row, document, or cell
- Receive notification if any changes are made to the list or document library


## Format data in Datasheet view

You can format the contents of a column that supports multiple lines of text if the column supports rich HTML text. You can format part of a cell, or one or more cells or columns of this data type.
Note To enable support for rich HTML text for a column, in the Change Column page, select Yes under Allow rich HTML text.

1. Select the text or the cells that you want to format.
2. If the task pane is not open, click Task Pane on the toolbar.
3. Apply the format you want. You can change font settings, text and background color, and indentation and alignment. You can also organize text into a list of numbered or bulleted items.

## Notes

You can clear rich HTML text formatting by selecting text, then pressing CTRL+Space. However, CTRL+Space does not remove the alignment setting.

You cannot format read-only cells or the Total row.
Formatting does not apply to rows hidden as a result of a filter.

## Turn on or off text wrapping for a column in Datasheet view

If text wrapping is on for a column, the cell contents in the column will be displayed in more than one line. If text wrapping is off, each cell will display only what will fit in a single line. By default, text wrapping is on for all columns.

Text wrapping applies to the following data types: single line of text, multiple lines of text, choice, multi-choice, and lookup.

Right-click the column header for which you want to change the setting, and click Turn Wrap Text Off or Turn Wrap Text On.

## Troubleshoot formatting data in Datasheet view

- I do not see the formatting buttons in the task pane.
- The formatting does not apply to all rows in the column.
- I copied text into a multiple line of text column, but the formatting does not work.
- I get a message about a cell exceeding its maximum size.


## About filtering data in Datasheet view

You can apply a filter to a list in two ways - when defining a view, and when a list is opened in Datasheet view. When you specify a filter as part of the view definition, filter criteria are saved as part of the view definition, and are applied each time you open the list in the specified view. In addition to saved filters, you can apply one or more filters to a list in Datasheet view. These filters are not saved.

For example, the Managers view of the Employee list is created by filtering for employees whose Manager column is set to Yes. You can further filter this list to view managers whose Country column is set to USA and Region column is set to West. The following illustration shows managers who work in the western region of the United States.

| Name | Title | Manager | Region | Country | - |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| B | VP (HR) | Yes | West | USA |  |
| E | Sales Mgr | Yes | West | USA |  |
| G | Lead <br> Technician | Yes | West | USA |  |
|  |  |  |  |  |  |

Note the appearance of the drop-down arrow in the header of the Region and Country columns.

When you switch views or close the Managers view, the Country and Region filters will not be saved. When you open the list in Managers view next time, the list will show all managers.

Columns of type multiple lines of text and hyperlink do not support filtering. For columns of type attachment or picture, you can filter for Yes and No values. For columns of type multi-choice, cells that contain the selected value will be included.

## Apply a filter in Datasheet view

1. Click the drop-down arrow in the column header.

Note If a column does not support filtering, the filtering commands will be disabled for that column.
2. In the list, do one of the following:

- Click an entry to filter for records that have the matching entry. For multi-choice columns, records that contain the selected entry will be selected.
- Click (Blanks) to filter for records that don't have a value.
- Click (Non-Blanks) to filter for records that have a value.
- Click Custom Filter to define custom filter criteria. In the Custom Filter dialog box, specify the comparison operators and values. For example, to search for names beginning with "A" or " B ", select begins with in the top left list and type A in the top right list. Select begins with in the middle left list and $\mathbf{B}$ in the middle right list. Select the top Or operator to link the two criteria, and click OK.

Note You can filter and sort multiple columns in a view.

## Sort rows in Datasheet view

You can sort data in a Datasheet view in two ways - when defining a view, and when a list is opened in Datasheet view. When you specify a sort order as part of the view definition, it is saved as part of the definition, and is applied each time you open the view. In addition, you can sort data after opening the view. These sort orders are not saved.

- To sort on a single column
- To sort on multiple columns


## Notes

You can also sort on multiple columns by using the drop-down arrow in the column headers. The first column you sort on becomes the innermost column, and the last column you sort on becomes the outermost column.

You can apply one or more filters on a sorted view.
The columns of type multiple lines of text and multi-choice do not support sorting. If a column does not support sorting, the sorting commands will be disabled for that column.

The order of rows after sorting depends on the type of data in the columns that are used for sorting.

- Default sort orders for different types of data


## Remove a filter or sort order in Datasheet view

A filtered or sorted column appears like this.

| Last Name |
| :--- | :--- |
| USA |
| USA |
| USA |
| USA |
| USA |

To see if a column is filtered, click the drop-down arrow in the column header. If a column has a filter, an entry other than Show All will be selected in the drop-down list.

- To remove a filter from a column
- To remove all filters and sorting orders


## Troubleshoot sorting and filtering in Datasheet view

- I cannot save the sort order or filter criteria in the view.
- The sort and filter commands are not available.
- Some of the operators are missing in the Custom Filter dialog box.
- I cannot see the column on which I want to sort rows or filter data.
- The sort order does not match the settings on my computer.
- I applied a filter or sort but the view does not appear filtered or sorted.


## About moving, copying, and pasting cell contents in Datasheet view

You can move or copy portions of a list to another location in the same list, or to another document. When you move a selection, the selection is removed from the list and is moved to the Clipboard. When you copy a selection, the selection remains in the list, and a copy is placed in the Clipboard. Pasting the contents of the Clipboard transfers it to the destination.

- Moving or copying parts of a list
- Pasting contents of the Clipboard into a list


## Troubleshoot moving, copying, and pasting cell contents in Datasheet view

- I cannot paste data in a column, or I get the message " N cells could not be pasted".
- I get the message "Some data was truncated".
- I get the message "Cells in the region are required and cannot be cleared".
- I get the message "Cells/Rows in the region are read-only".
- I get the message "Cannot be pasted because the paste area is not completely on the list".
- I get the message "Cannot be pasted because the cut or copy area is not the same size as the paste area".
- I get the message "Some rows were skipped".


## Automatically fill cells with data

You can fill a range of cells with a specific value, a range of values, or with linearly increasing values.

- Copy contents of a cell to other cells within the column
- Copy a range of values to other cells within the column
- Linearly increasing values for a range of cells within the column


## Notes

You can automatically fill more than one column in a single operation. The selected cells in each column will be used to fill the destination cells.

You cannot automatically fill a calculated column or a column that contains attachments. Columns with the following data types do not support filling with linearly increasing values: Boolean, Choice, Multivalue Choice, and Lookup.

If you try to fill a cell that is read-only or attempt to fill a cell with an invalid value, the fill operation will fail for that cell.

## Troubleshoot automatically filling cells with data

- I get the message "Cells in the destination region are read-only".
* I get the message "Rows were skipped because new rows contained invalid values in required fields".
- I get the message "You cannot perform this operation on a calculated column".
- I get the message "Attempting to fill cells or rows with invalid values".
- I get the message "Some data was truncated".


## About displaying real-time status (presence information) in Datasheet view

When a list or a document library is open in Datasheet view, you can view the real-time status of users listed in certain columns. You can find out whether the user is online, busy, or on the phone. Based on this information, you can initiate a chat session, send them mail, or schedule a meeting.

You must be signed in to Windows Messenger to view presence information. Similarly, information about other users is available only if they are signed in to Windows Messenger and their e-mail address is available on the site. If a user is not signed in, their status will appear as offline.

The following illustration shows the MyLibrary list in Datasheet view.


This list has two columns that can display real-time status (presence) information. Note the Presence (8) icon to the left of the column names in the Name and Email columns. Any column whose data type is set to Lookup and gets its information from the User Information list can display presence information. The User Information list contains information, such as display name and e-mail address, about other users of the SharePoint site. Depending on the type of list, one or more columns look up the User Information list by default. In addition, you can add your own lookup columns and enable them to display presence information.

When you open the view, you see icons in rows that correspond to users
who are online or busy, and a ScreenTip describing the status of each user. If you do not see an icon, it means the user is offline or not signed in to Windows Messenger. You can display the icon for a user who is offline by pausing the mouse cursor over the cell. Note that you must not be in edit mode, otherwise you cannot see any presence information.
If the user is online, you see \& near the left margin. If the user is busy or on the phone, you see $\delta$ in the cell. For a complete list of icons and their descriptions, see Windows Messenger Help.

Clicking on a Presence icon displays a drop-down list of actions that you can take to collaborate with the user, such as send an e-mail message or start a chat session. The list of actions varies with the status of the user.

You cannot sort or filter a list based on presence information. You can turn off the display of presence information in a column that looks up the User Information list. A system administrator can turn off presence information for an entire site.

## View presence information in Datasheet view

1. Make sure the view includes at least one column that is set to display presence information. If a column can display presence information, you will see the Presence (8) icon in the column header.
, How?
2. Exit edit mode by pressing ESC.
3. Pause the mouse pointer over a row in the column to display the Presence icon.
4. Click the down arrow in the icon to display a list of actions that you can take to collaborate with the user.

## Troubleshoot displaying presence information in Datasheet view

I cannot view presence information in a list.
Try one or more of the following:
Verify that the list has one or more columns that look up the User Information list and include presence information. Right-click a column that displays user information, and click Edit/Delete Column. In the Change Column page, verify that the type of the column is Lookup and that it gets its information from the User Information list. At the bottom of the page, make sure the Include presence information check box is selected.

When a column supports the display of presence information, it displays the Presence ( 8 ) icon before the column name in the column header.

If a view does not include a column that can display presence information, add a column yourself.

If you are not signed in to Windows Messenger, do so.
If hovering the cursor over the cells in the column does not display a Presence icon in the cell, it means the user's e-mail address is not available.

Verify that the site supports display of presence information. To do this, contact your system administrator.

## Submitting data changes to a list manager for approval in Datasheet view

If you are adding or editing data in a list that requires content approval, your changes will not be available to the other users until it is approved by a user who has the Manage Lists right.

Note If you have Manage Lists right to the list, then the changes you make to the list are automatically set to Approved.

For more information on working with lists that require content approval, see Microsoft Windows SharePoint Services Help. To display Windows SharePoint Services Help, click Help on the page toolbar.

Do the following to submit your changes for approval if you do not have the Manage Lists right:

1. Open the list in My Submissions view.

This view displays all the items you have added to the list, including rejected items. The view displays the Approval Status and Comment columns, in addition to all the other columns in the list. However, the Approval Status, Comment, Modified, and Modified By columns are read-only.
2. If the list displays in Standard view, click Edit in Datasheet to switch to Datasheet view.
3. Add or edit a row.

When you add or edit a row, the Approval Status is automatically set to Pending. This includes rows that were previously set to Approved. When a row is edited, it is treated as a new row, so needs to be sent for approval.

## Approve or reject pending items in Datasheet view

If you have the Manage Lists right for a list, and the list is set up to require content approval, you can review the data that different users add to the list before it is displayed to the public. After reviewing the data, you can approve or reject items. Only approved items will be displayed to the site users.

For more information on lists that require approval, see Microsoft Windows SharePoint Services Help. To display Windows SharePoint Services Help, click Help on the page toolbar.

1. To review data entered by other users, open the list in Approve/reject Items view. This view displays the Approval Status and Comments columns in addition to all the columns in the list.
2. If the list displays in Standard view, click Edit in Datasheet to switch to Datasheet view. In Datasheet view, you can bulk edit the Approval Status and Comments columns to save time.
3. Filter the view to display only pending items. Click the dropdown arrow in the column header of the Approval Status column and click Pending.
4. To approve or reject a single row, review the data in the row, and set the Approval Status column to either Approved or Rejected. Enter a comment in the Comments column.

To update adjacent rows with the same status or comment, enter the value in the first row, and drag the fill handle to include the rows you want. You can also copy and paste values in the columns.

Note You can also change the status of an approved or rejected item back to pending.

## About working with document libraries in Datasheet view

Datasheet view offers the same level of support for document libraries as it does for lists．You can open a document library in Datasheet view to view the contents of a library，add and delete folders and documents，and edit documents and change their properties．

The following illustration shows a document library in Datasheet view．
$\square$ New Document｜ 3 Upload Document｜New Folder｜屚 Show in Standard View｜

| Type | Name | Modified | 8 Modified By | － | Checked Out To | － |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 国 | Asia－Summary．rpt | 2／9／2003 03：05 PM | Salesman1 |  |  |  |
| 国 | Canada－Detailed．doc | 2／8／2003 03：12 PM | Salesman 1 |  | Salesman1 |  |
| 国 | Last Year＇s Reports | 2／8／2003 03：09 PM | Salesman1 |  |  |  |

Note that the library has three views：All Documents，Explorer view，and Sales Reports－Datasheet．

The library is currently open in Sales Reports－Datasheet view．Each row in the view contains information about a document or a folder．The view＇s folder setting is set to Show documents inside folders，so the documents located under the folder Last Year＇s Reports are shown only when you click the name of the folder．

You can work with a document library in Datasheet view in two ways．
In All Documents view，or from any other Standard view，you can click the Edit in Datasheet button．

Create one or more Datasheet views for the library．
You cannot open the Explorer view of a document library in Datasheet view．

Important To view a document library in Datasheet view，your computer must meet certain software requirements．

If the view＇s folder setting is set to Show documents inside folders， only the top－level documents and folders are displayed when you open the library．If the folder setting of the view is set to Show all documents without folders，then all documents，including those that are located under different folders，are displayed as rows when you open the library．

## Managing documents and folders in Datasheet view

You can add and upload documents to the library the same way you add and upload documents in All Documents view or in any other Standard view.

If the view's folder setting is set to Show documents inside folders, you can add new folders, and navigate to different folders in the library.

You can open, edit, and check in or check out a document.
You can delete documents and folders in Datasheet view. When you delete a folder, the contents of the folder, including subfolders, are deleted from the library.

You can add columns, or delete and modify a column that you or another user added to the view. You can also enter and edit data stored in such columns in rows that contain documents. Rows corresponding to folders cannot be edited. Note that columns such as Type and Modified By are read-only. You cannot modify or delete them, nor can you enter or edit the contents of such columns.

You can show or hide the Total row.
You can sort and filter the library based on different columns, including the Type column.

Datasheet view does not display the star (*) row for a document library.
You cannot enter a value in the Name column either by dragging the fill handle, or by selecting a value from the cell's drop-down list.

## Open a folder or document in Datasheet view

To navigate to a folder, or to open a read-only copy of a document, simply click the name of the folder or file.

Note You can also click the icon in the Type column.
If the document was created using Microsoft Office, the document will be opened using the appropriate Office application. All other documents will be opened in Internet Explorer.

## Edit a document in Datasheet view

You can only edit documents created using a Microsoft Office application such as Microsoft Excel or Microsoft PowerPoint.

Right-click the row header or any cell in the row corresponding to the document that you want to edit, point to Document, and then click Edit Document.

The document will be opened using the appropriate Office application. You can edit the document, and save the document back to the library or to a different location.

Note You cannot edit a document that has been checked out by another user. You also cannot edit any of the columns in the row corresponding to the document until it is checked back in.

## Delete a folder or document in Datasheet view

Deleting a folder will delete all of its contents, including subfolders.
Right-click the row header or any cell in the row corresponding to the folder or document that you want to delete, then click Delete Folder or Delete Document.

Note You can only delete a single folder at a time.

## Check in or out a document in Datasheet view

- To check in a document that is checked out to you, but not currently open
- To check out a document


## Add, view, or remove documents attached to a row in Datasheet view

You can attach one or more documents to a row in certain types of lists.

1. Open a list in Datasheet view, or switch to Datasheet view by clicking the Edit in Datasheet button on the toolbar.
2. Right-click the Attachments column of a row, and click Edit Attachment.

Note You cannot add attachments to a row that has not yet been committed.
3. To add an attachment, click Add. Then choose the file that you want to attach to the row.

To view an attachment, double-click it.
To remove an attachment, select it, and click Remove.

## View versions of a document in Datasheet view

If the document versions setting of a document library is set to store versions of documents, then you can view information on the different versions of each document in the library.

Right-click the row header or any cell in the row corresponding to the document whose versions you want to view, point to Document, and then click Document Versions.

Make a document available for discussions in Datasheet view

Right-click the row header or any cell in the row corresponding to the document that you want to make available for discussions, and click Discuss.

The document will open in Internet Explorer. The browser window will display the Discussions toolbar.

## Troubleshoot document libraries in Datasheet view

- I cannot open a document library in Datasheet view.
- I don't see any of the folders in the view.
- I cannot edit a document.
- I cannot check in or check out a document.
- I cannot view the versions of a document.
- I cannot modify parts of a library.


## About resolving conflicting changes in Datasheet view

A conflict arises when two users make a change to the same portion of a list's data or structure. The user who submits a change first will succeed in committing his or her changes, but the second user will be notified of a conflict.

For example, user A changes the City column of the third row from Dallas to Seattle, and at the same time, you change the cell from Dallas to Houston. User A's changes are submitted to the server first, followed by your changes. The server informs you of a conflict and lets you resolve the conflict.

Note A conflict will occur even when users edit different cells in the same row.

The following illustration shows the list with the Conflict icon in the header of the third row.


You won't be able to make any changes to a row that has a conflict until you resolve the conflict.

Clicking the Conflict icon displays the Resolve Conflicts dialog box.
Note If you attempt to delete a row that has been updated by another user, a conflict will occur, but you won't see the Conflict icon because the row has already been updated. In that case, click Resolve in the status bar to open the Resolve Conflicts dialog box.


The details grid displays all the columns in your current view. For the affected row, it shows the change you made as well as the change made by the other user. The changed columns appear highlighted. Note that you cannot edit the values displayed in the details grid. At the top of the dialog box you can see the name of the user who made the change, and the date and time the change was made.

When two or more users make a series of changes, it is possible to get multiple conflicts. A new conflict could occur when you are trying to resolve an existing conflict. If there is more than one conflict, the Resolve Conflicts dialog box will enable you to view details of each conflict by clicking the Previous and Next buttons on the top right of the dialog box. The conflicts are sorted on row numbers. In other words, the conflict in the third row appears before the conflict in the fourth row. As you scroll through the conflicts, the affected row gets the focus in the datasheet. You can also view the details of a specific conflict by clicking the Conflict icon in the affected row. The dialog box will automatically scroll to the selected conflict, but you can view details of other conflicts by clicking Previous or Next.

Note If there are one or more errors in the view in addition to conflicts, the Resolve Conflicts dialog box will include details of the errors, and enable you to resolve them.

Based on the information in the details grid, you could either ignore the changes you made, or retry your changes. If the changes were made to different columns of a row, retrying your changes will merge your change with user A's change. If the changes were made to the same cell, your changes will overwrite user A's change. When there are multiple conflicts, you can take individual action for each conflict, or take a single action for all conflicts. To ignore or retry all of your changes, click Discard All My Changes or Retry All My Changes.

You can close the dialog box without taking any action, but you will not be able to leave or refresh the list, or make changes to a calculated column, until you resolve the conflict.

- Special scenarios in the Resolve Conflicts dialog box


## Resolving structural conflicts

It is also possible to get a structural conflict when two or more users are editing different parts of a list. A structural conflict occurs when it is not possible to resolve changes. For example, user A deletes a column, and user $B$ attempts to update it. Or, user A changes the column's data type, and user $B$ enters data that is not compatible with the new data type. In such situations, user B will be asked to refresh the list. Refreshing the list will retrieve the latest version of the list, but user B's changes will be discarded.

## Resolving a conflict could lead to a new conflict or error

Resolving a conflict can result in one or more new conflicts or errors. For example, a third user, user C , makes a series of conflicting changes while you are resolving conflicts that arose due to user A's changes. If trying to reapply your changes results in a new conflict, it will be added to the list of existing conflicts, and the dialog box will be updated.

## When do conflicts occur?

A conflict arises when two users make a change to the same portion of a list's data or structure. The user who submits a change first will succeed in committing his or her changes, but the second user will be notified of a conflict.

- Types of changes that you can make to a list
- Scenarios that will result in a conflict
- Scenarios that will not result in a conflict
- Scenarios that will result in a structural conflict
- Scenarios that will not result in an error message or conflict


## About resolving errors in Datasheet view

You might encounter one or more errors while working with the Datasheet view. Some errors can be resolved by simply repeating the action or by refreshing the view, while others require a little more effort. Depending on the error, the view will provide you adequate information to help you resolve the error.

## When errors can occur

## Errors can occur when you:

Open a Datasheet view. For example, the view might not load or might not display any data.

View or edit data in the view. For example, committing your data changes might fail if the server could not be found.

View or edit the list structure. For example, deleting a column might result in an error due to lack of permissions.

View or edit the view definition. For example, reordering columns might fail due to a server timeout.

## Types of errors

There are two types of errors - those that you can resolve by retrying your changes and those that you can resolve by discarding your changes.

Errors that you can resolve by retrying your changes:
No response from the server. This could be because of a timeout.
Server is busy or cannot be found.
Server response is not legible.
Any other unexpected error.
Errors that you can resolve by discarding your changes:

You do not have the necessary permissions to make the change.
You have been blocked from adding content to the site.
You have exceeded your storage limits for the site.
To avoid these errors, contact your system administrator.

## Resolving errors

When an error occurs, the view displays the Error ( ) icon in the corresponding row, and also in the status bar. You will also see the text Click to resolve errors in the status bar. If there are conflicts and errors, you will see the text Click to resolve data conflicts and errors.

The following illustration shows the Resolve Errors dialog box.


The details grid displays all the columns in your current view. For the affected row, it shows the change you made. Note that you cannot edit the values displayed in the details grid. At the top of the dialog box, you can see the description of the error.

If there are multiple errors, you can view details of each error by clicking the Previous and Next buttons on the top right of the dialog box.

Based on the error information in the details grid, you could either ignore the changes you made, or retry your changes. When there are multiple errors, you can take individual actions for each error, or take a single action for all errors. To ignore or retry all of your errors, click Discard All

## My Changes or Retry All My Changes.

Note that any action you take to resolve an error might result in a new error. In that case, the dialog box will be updated to include details of the new error.

You can close the dialog box without taking any action, but you will not be able to leave or refresh the list, or make changes to a calculated column, until you resolve the error.

## Resolve conflicting changes and errors in Datasheet view

1. Click Resolve on the status bar to display the Resolve Conflicts and Errors dialog box.
2. Do one of the following:

- To resolve the currently displayed conflict or error by ignoring the changes you made to the row, click Discard My Changes. Your changes will be lost.
- To resolve all pending conflicts and errors by ignoring all of your changes to the list, click Discard All My Changes.
- To resolve the currently displayed conflict or error by reapplying your changes, click Retry My Changes. In case of a conflict, if you and the other user change the same column, your changes will overwrite the other user's changes. If you edit different columns, your changes will be merged with the other user's changes.
- To resolve all pending conflicts and errors by reapplying your changes, click Retry All My Changes.
- To view the details of the next conflict or error, click Next on the top right corner of the dialog box.
- To view the details of the previous conflict or error, click Previous on the top right corner of the dialog box.
- To resolve conflicts and errors at a later time, click Close on the dialog box title bar.


## Notes

The details grid shows all the columns in your current view. If the columns are not visible, use the horizontal scroll bar to scroll, or drag the right edge of the dialog box to increase the width of the details grid.
To zoom the contents of a column, click the column in the details grid. Your changes and the other user's changes will be displayed in the Field Details dialog box. The dialog box is also useful for viewing rich text formatting changes.

The details grid displays Deleted row, instead of a row of data, if either you or the other user deletes a row. If the other user deletes the row, the dialog box does not display the name of the user or the date and time of the deletion. Also, you will not be able to retry your changes.

## About exporting a Datasheet view

You can export a Datasheet view to Microsoft Access or Microsoft Excel. With Access, you can export the view to a table in a new database or to an existing database. You can also choose to export to a static table, or export to and create a linked table in Access. With Excel, you can export the Datasheet view to an existing worksheet, a new worksheet or a new workbook. This also creates a link between the Datasheet view and the worksheet and data changes in one can be syncrhonized in the other.

## Exporting to Access

When you export from Microsoft Windows SharePoint Services to Access, you are creating a static table in Access with data from
Datasheet view. However, changes you make in that view will not be reflected in the static table, and changes in the table will not be synchronized in Datasheet view.

## Creating a linked table in Access

When you create a linked table in Access from Windows SharePoint Services, you are creating a new table in Access with data from the Datasheet view. A link is created between the view and the table. You can change the data in Datasheet view and the changes are automatically reflected in the table. Similarly, you can change the data in the table and the changes are automatically reflected in Datasheet view.

Note There are columns in some types of lists that are modifiable in the Datasheet view in Windows SharePoint Services, but are read-only in linked Access tables.

## Exporting and linking to Excel

When you export and link from Windows SharePoint Services to Excel, you are exporting data from Datasheet view to Excel and creating a link to the Excel worksheet. This synchronizes the data between Datasheet view and the worksheet:

You can change data in the Datasheet view and have the changes reflected in the worksheet.

You can change data in the worksheet and update the Datasheet view with the changes.

## Export contact or event information

Export contact information
In the Standard view and the Datasheet view of a contact list, you can export an entire contact list or an individual contact from a contact list to Microsoft Outlook.

- Export a contact list
- Export an individual contact


## Export event information

In the Standard view and the Datasheet view of a event list, you can export an entire event list or an individual event from an event list to Microsoft Outlook.

- Export an event list
- Export an individual event


## Export and link a Datasheet view to Excel

1. In the Datasheet view toolbar, click Task Pane to display the Task Pane for the Datasheet view.
2. Click Export and Link to Excel.

Windows SharePoint Services exports the Datasheet view to Microsoft Excel as a Web query file. If Excel is already open, Excel prompts you to open the Web query file and allows you to choose to import the data in the Web query file into an existing worksheet, a new worksheet or a new workbook. Otherwise, Excel opens and imports the Datasheet into a new workbook. Excel then displays the imported data as an Excel list in the worksheet and links the worksheet with the Datasheet view.

- Update Datasheet view with changes in worksheet
- Update worksheet with changes in Datasheet view


## Export or link a Datasheet view to Access

## Export a Datasheet view to Access

1. In the Datasheet view toolbar, click Task Pane to display the Task Pane for the Datasheet view.
2. Click Export to Access.
3. Choose to export the Datasheet to an existing database or a new database and click OK.

Microsoft Access prompts you to specify the location of the database and opens a table with the exported data.

## Link a Datasheet view to Access

You can link a Datasheet view to Access by creating in Access a linked table with the Datasheet view.

1. In the Datasheet view toolbar, click Task Pane to display the Task Pane for the Datasheet view.
2. Click Create a linked table in Access.
3. Choose to export the Datasheet to an existing database or a new database and click OK.

Access prompts you to specify the location of the database and opens a linked table with the exported data.

- Update Datasheet view with changes in linked table
- Update linked table with changes in Datasheet view


## Troubleshoot exporting Datasheet views

## Exporting to Microsoft Office applications in general

- I get the message "Office application not available."

Exporting to Microsoft Excel

- I can't export my Datasheet view to Microsoft Excel.
- Error message "This operation cannot be performed because either Microsoft Excel 2003 is not installed on this computer, or it is not the default version. "


## Exporting to Microsoft Access

- I can't export or link my Datasheet view to Microsoft Access.
- I need to export or link a list in Windows SharePoint Services to a table in Access 2000 format.
- The Microsoft Access table I am trying to connect to is unavailable.


## Create an Access report with a Datasheet view

When you create a report in Microsoft Access with a Datasheet view, you create a linked table with the data in the Datasheet view and generate a report based on the data.

1. In the Datasheet view toolbar, click Task Pane to display the Task Pane for the Datasheet view.
2. Click Report with Access.
3. Choose to export the Datasheet to an existing database or a new database and click OK.

Access prompts you to specify the location of the database and opens a linked table with the exported data. It uses AutoReport to generate a report that displays all the fields and records in the linked table. For more information on AutoReport, see "Create a report" in Access help.

## Create an Excel chart with a Datasheet view

When you create a Microsoft Excel chart with a Datasheet view, you first export and link the Datasheet view to Excel, and then create a chart in Excel based on the exported data.

1. In the Datasheet view toolbar, click Task Pane to display the Task Pane for the Datasheet view.
2. Click Chart with Excel.

Windows SharePoint Services exports the Datasheet view to Excel as a Web query file.

Excel then prompts you to open the Web query file. If Excel is already open, it allows you to choose to import the data in the Web query file into an existing worksheet, a new worksheet or a new workbook. Otherwise, Excel opens and imports the Datasheet into a new workbook. Excel displays the imported data as an Excel list in a worksheet, links the worksheet with the Datasheet view, and prompts you to create a chart using the Chart Wizard. For more information on Excel charts, see "About charts" in Excel help.

## Create an Excel PivotTable with a Datasheet view

When you create a Microsoft Excel PivotTable with a Datasheet view, you first export and link the Datasheet view to Excel, and then create a PivotTable in Excel based on the exported data.

1. In the Datasheet view toolbar, click Task Pane to display the Task Pane for the Datasheet view.

## 2. Click Create Excel PivotTable Report.

Windows SharePoint Services exports the Datasheet view to Excel as a Web query file.

Excel then prompts you to open the Web query file. If Excel is already open, it allows you to choose to import the data in the Web query file into an existing worksheet, a new worksheet or a new workbook. Otherwise, Excel opens and imports the Datasheet into a new workbook. Excel displays the imported data as an Excel list in a worksheet and links the worksheet with the Datasheet view. Excel displays the PivotTable field list and the PivotTable toolbar and prompts you to create a PivotTable. For more information on Excel PivotTables, see "About PivotTable reports" in Excel help.

## Print a Datasheet view with Excel

When you print a Datasheet view with Microsoft Excel, you first export and link the Datasheet view to Excel, and then print the exported data in Excel.

1. In the Datasheet view toolbar, click Task Pane to display the Task Pane for the Datasheet view.

## 2. Click Print with Excel.

Windows SharePoint Services exports the Datasheet view to Excel as a Web query file.

Excel then prompts you to open the Web query file. If Excel is already open, it allows you to choose to import the data in the Web query file into an existing worksheet, a new worksheet or a new workbook. Otherwise, Excel opens and imports the data into a new workbook. Excel displays the imported data as an Excel list in a worksheet, links the worksheet with the Datasheet view, and prompts you to print the Excel list.

## About displaying totals and calculated values in Datasheet view

You can perform different types of calculations in a list in Datasheet view． You can display aggregate values，such as sum and average，for a column in the list．You can add calculated columns that use a formula to calculate values for each row in the list．You can also use formulas when specifying a default value for a column．

The following illustration shows the Employee－Payroll list in Datasheet view．The list displays the aggregate values in the Total row at the bottom of the list，and a calculated column titled Net Pay．

|  | （1） | Name | $\checkmark$ | Taxable Earnings | Taxes Withheld | After－Tax Deductions | Net Pay | － |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | A |  | \＄4998．04 | \＄1004．45 | \＄409．00 | \＄3584．5 |  |
|  |  | 日 |  |  | ngs］－（Taxes | Withheld ${ }_{\text {anc }}+[$ After | ¢ィフロの |  |
|  |  | C |  | = [Taxable Ear |  | $\frac{\text { Withheld }]+ \text { After }}{\text { W320．00 }}$ | W4zouc |  |
|  |  | D |  | \＄3834．00 | \＄1024．90 | \＄590．00 | \＄2219．1 |  |
| ＊ |  |  |  |  |  |  |  |  |
|  | Total | 4 |  |  |  |  | \＄11767． |  |

The Total row displays a count of the rows in the Name column and the sum of values in the Net Pay column．The Net Pay column uses the formula that is displayed in the ScreenTip to calculate values for each row．
－About displaying aggregate values
－About displaying calculated values in a column
－About using a formula to calculate default values for a column

## About formulas

Formulas are equations that perform calculations on values in a list. A formula starts with an equal sign (=). For example, the following formula multiplies 2 by 3 and then adds 5 to the result.
$=5+2 * 3$
You can use a formula in a calculated column and to calculate default values for a column.

A formula can also contain any or all of the following: functions, column references, operators, and constants.

## Parts of a formula

$=\mathrm{PI}()^{*}[\text { Result }]^{\wedge} 2$
Functions The PI() function returns the value of pi: 3.142...
References (or column names) [Result] represents the value in the Result column for the current row.

Constants Numbers or text values entered directly into a formula, such as 2.

Operators The ^ (caret) operator raises a number to a power, and the * (asterisk) operator multiplies.

A formulas might use one or more of the above elements. Here are some examples of formulas (in order of complexity).

- Simple formulas (such as $=128+345$ )
- Formulas that contain column references (such as =[Revenue] - [Cost])
- Formulas that call functions (such as =AVG(1, 2, 3, 4, 5))
- Formulas with nested functions (such as =SUM(ROUND([Cost],2), [Profit])


## About calculation operators

Operators specify the type of calculation that you want to perform on the elements of a formula. Lists support three different types of calculation operators: arithmetic, comparison, and text.

- Types of operators
- The order in which a list performs operations in a formula


## About constants in formulas

A constant is a value that is not calculated. For example, the date 10/9/2008, the number 210, and the text "Quarterly Earnings" are all constants. Constants can be of the following data types:

String (Example: =[Last Name] = "Smith")
String constants are enclosed in double quotes and can be up to 255 characters.

Number (Example: =[Cost] >= 29.99)
Numeric constants can include decimal places, and can be positive or negative.

Date (Example: =[Date] <> 7/7/2002)
Date constants do not require delimiters.
Boolean (Example: =IF([Cost]>[Revenue], "Loss", "No Loss")
Yes and No are Boolean constants. You can use them in conditional expressions. In the above example, if Cost is greater than Revenue, the IF function returns Yes, and the formula returns the string "Loss". If Cost is equal to or less than Revenue, the function returns No, and formula returns the string "No Loss".

## About column references in a formula

A reference identifies a cell in the current row in a datasheet and tells a list where to look for the values or data you want to use in a formula. For example, [Cost] references the value in the Cost column in the current row. If the Cost column has the value of 100 for the current row, then = [Cost]*3 will return 300.

With references, you can use data contained in different columns of a list in one or more formulas. Columns of the following data types can be referenced in a formula: Single line of text, number, currency, date and time, choice, yes/no, and calculated.
You use the display name of the column to reference it in a formula. If the name includes a space or a special character, you must enclose the name in square brackets ([ ]). References are not case-sensitive. For example, you could reference the Unit Price column in a formula as [Unit Price] or [unit price].
Note You cannot reference a value in a row other than the current row. You also cannot include column references in a formula that is specified as the default value of a column.

## Examples of common formulas

Note You can use the following examples in calculated columns. Examples that do not include column references can be used to specify the default value of a column.

- Conditional formulas
- Date and time formulas
- Math formulas
- Text formulas
- Other formulas


## Show or hide aggregate values in Datasheet view

To show or hide aggregate values for all columns in the list, click Totals on the list toolbar.

If the Total row is not visible, it appears at the bottom of the list. It displays the sum of values for numeric columns, and if there are no numeric columns in the list, a count of non-empty rows in the last column in the list. If the row was visible when you clicked Totals, it will be hidden.

To show or hide aggregate values for one or more columns in the list, do the following:

1. Click a column in the Total row.
2. From the list of aggregate functions, select None to hide the total value. Select a function other than None to display a total value.

## Troubleshoot totals and calculated values in Datasheet view

- I get a message saying the results of the formula will be sent to the server.
- I get a syntax error.
- The cell displays the formula instead of the result.
- I get a message about pending changes when I edit a calculated column.
- I get a timeout or unanticipated error.
- I get an error indicating that the list structure has changed.
- I get an error indicating that I do not have permission to change calculated columns in the list.
- I am having problems with columns or column references.
- The calculated column displays a string that I do not recognize.


## Edit a formula in Datasheet view

1. Click any cell in the calculated column.
2. Click the cell again to display the current formula.
3. Edit the formula and press Enter.

Note After you type the equal sign (=) in a calculated column, you can paste a column reference simply by clicking the cell in that column that belongs to the current row. However, if the column is of a data type that does not support calculations, if you are attempting to select a cell in a different row, or select more than one cell, the list will not paste the column reference in the formula.
4. Click Continue to confirm your changes.
5. If there are pending changes, or conflicts and errors, in the list, you will be prompted to commit or discard your changes, conflicts, and errors. Changing a formula results in a change to the structure of the list, so the new formula can take affect only after all changes have been submitted to the server or discarded, and all conflicts and errors have been eliminated from the list.

Click OK to commit changes, and resolve conflicts and errors.
6. The list will send the pending changes to the server. If there are conflicts and errors, you will see the Resolve Conflicts and Errors dialog box. Accept or discard your changes.

## About functions

Functions are predefined formulas that perform calculations by using specific values, called arguments, in a particular order, or structure. Functions can be used to perform simple or complex calculations. For example, the ROUND function rounds off a number in the Cost column.
=ROUND(Cost, 2)
Structure The structure of a function begins with an equal sign (=), followed by the function name, an opening parenthesis, the arguments for the function separated by commas, and a closing parenthesis.

Function name Name of a function that is supported by lists. Each function takes a specific number of arguments, processes them, and returns a value.

Arguments Arguments can be numbers, text, logical values such as True or False, or column references. The argument you designate must produce a valid value for that argument. Arguments can also be constants, formulas, or other functions.

Argument tooltip A tooltip with the syntax and arguments appears as you type the function. For example, type =ROUND( and the tooltip appears. Tooltips only appear for built-in functions.

- Nested functions

Note Lists do not support the RAND and NOW functions. The TODAY and ME functions are not supported in calculated columns, but are supported in the default value setting of a column.

## Add or edit a calculated column in Datasheet view

You can add a column that calculates values for each row based on other values in the same row.

- Add a calculated column
- Edit a calculated column


## Notes

Adding or editing a column results in a change to the list structure. You can make a structural change to a list, only if there are no pending changes, conflicts, and errors. If the list encounters one of these in the list, you will prompted to wait until all changes are submitted to the server, and resolve any conflicts and errors, before you can add or edit a column.

You cannot change the data type of a column to Calculated. To use a formula in a non-calculated column, you must delete the column and then add a calculated column.

## Change the type of total value displayed in a column in Datasheet view

1. Click the Total row of the column for which you want to change the total type.
2. Click the drop-down arrow, and select the function you want from the list.

Note Selecting None from the list for a column turns off the total value for that column.

## DATE

Returns the sequential serial number that represents a particular date.

## Syntax

DATE(year,month,day)
Year The year argument can be one to four digits.
If year is between 0 (zero) and 1899 (inclusive), the value is added to 1900 to calculate the year. For example, DATE $(108,1,2)$ returns January 2, 2008 (1900+108).

If year is between 1900 and 9999 (inclusive), the value is used as the year. For example, DATE $(2008,1,2)$ returns January 2, 2008.

Month is a number representing the month of the year. If month is greater than 12, month adds that number of months to the first month in the year specified. For example, $\operatorname{DATE}(2008,14,2)$ returns the serial number representing February 2, 2009.

Day is a number representing the day of the month. If day is greater than the number of days in the month specified, day adds that number of days to the first day in the month. For example, $\operatorname{DATE}(2008,1,35)$ returns the serial number representing February 4, 2008.

## Remarks

Dates are stored as sequential serial numbers so they can be used in calculations. By default, December 31, 1899 is serial number 1, and January 1, 2008 is serial number 39448 because it is 39,448 days after January 1, 1900.

The DATE function is most useful in formulas where year, month, and day are formulas, not constants.

## Example

| Year Month Day | Formula |
| :--- | :--- |
| 20081 | 1 |
|  | $=$ DATE([Year], |
|  | [Month],[Day]) |

Description (Result)
Serial date for the date (1/1/2008 or 39448)

## DATEDIF

Calculates the number of days, months, or years between two dates.
This function is provided for compatibility with Lotus 1-2-3.

## Syntax

## DATEDIF(start_date,end_date,unit)

Start_date A date that represents the first, or starting, date of the period. Dates may be entered as text strings within quotation marks (for example, "2001/1/30"), as serial numbers (for example, 36921, which represents January 30, 2001, if you're using the 1900 date system), or as the results of other formulas or functions (for example, DATEVALUE("2001/1/30")).

End_date A date that represents the last, or ending, date of the period.
Unit The type of information you want returned:

## Unit Returns

" $Y$ " The number of complete years in the period.
" M " The number of complete months in the period.
"D" The number of days in the period.
"MD" The difference between the days in start_date and end_date. The months and years of the dates are ignored.
"YM" The difference between the months in start_date and end_date. The days and years of the dates are ignored
"YD" The difference between the days of start_date and end_date. The years of the dates are ignored.

## Remarks

Dates are stored as sequential serial numbers so they can be used in calculations. By default, December 31, 1899 is serial number 1, and January 1, 2008 is serial number 39448 because it is 39,448 days after January 1, 1900.

The DATEDIF function is useful in formulas where you need to calculate an age.

## Example

| Start_date | End_date | Formula | Description (Result) |
| :---: | :---: | :---: | :---: |
| 1/1/2001 | 1/1/2003 | DATEDIF(Start_date,End_date,"Y") | Two complet in the period |
| 6/1/2001 | 8/15/2002 | DATEDIF(Start_date,End_date,"D") | 440 days bet June 1, 2001 August 15, $2($ (440) |
| 6/1/2001 | 8/15/2002 | DATEDIF(Start_date,End_date,"YD") | 75 days betw June 1 and A 15, ignoring t years of the (75) |
| 6/1/2001 | 8/15/2002 | DATEDIF(Start_date,End_date,"MD") | The differenc between 1 ar - the day of start_date an day of end_d - ignoring tr months and $t$ years of the |

## DATEVALUE

Returns the serial number of the date represented by date_text. Use DATEVALUE to convert a date represented by text to a serial number.

Syntax

## DATEVALUE(date_text)

Date_text is text that represents a date in a date format. For example, "1/30/2008" or "30-Jan-2008" are text strings within quotation marks that represent dates.

If the year portion of date_text is omitted, DATEVALUE uses the current year from your server's built-in clock. Time information in date_text is ignored.

## Remarks

Dates are stored as sequential serial numbers so they can be used in calculations. By default, December 31, 1899 is serial number 1, and January 1, 2008 is serial number 39448 because it is 39,448 days after January 1, 1900.

Most functions automatically convert date values to serial numbers.

## Example

## Formula

=DATEVALUE("8/22/2008")
=DATEVALUE("22-AUG2008")
=DATEVALUE("2008/02/23") Serial number of the text date (39501)
=DATEVALUE(" $5-J U L ")$ Serial number of the text date, assuming the computer's built-in clock is set to 2000 (37807)

## DAY

Returns the day of a date, represented by a serial number. The day is given as an integer ranging from 1 to 31.

## Syntax

DAY(serial_number)
Serial_number is the date of the day you are trying to find.

## Remarks

Dates are stored as sequential serial numbers so they can be used in calculations. By default, December 31, 1899 is serial number 1, and January 1, 2008 is serial number 39448 because it is 39,448 days after January 1, 1900.

Values returned by the YEAR, MONTH and DAY functions will be Gregorian values regardless of the display format for the supplied date value. For example, if the display format of the supplied date is Hijri, the returned values for the YEAR, MONTH and DAY functions will be values associated with the equivalent Gregorian date.

## Example

## Formula Description (Result)

=DAY("15-Apr-2008") Day of the date (15)

## DAYS360

Returns the number of days between two dates based on a 360-day year (twelve 30-day months), which is used in some accounting calculations. Use this function to help compute payments if your accounting system is based on twelve 30-day months.

## Syntax

DAYS360(start_date,end_date,method)
Start_date and end_date are the two dates between which you want to know the number of days. If start_date occurs after end_date, DAYS360 returns a negative number.

Method is a logical value that specifies whether to use the U.S. or European method in the calculation.

## Method Defined

FALSE U.S. (NASD) method. If the starting date is the 31st of a month, or it becomes equal to the 30th of the same month. If the ending omitted date is the 31st of a month and the starting date is earlier than the 30th of a month, the ending date becomes equal to the 1st of the next month; otherwise the ending date becomes equal to the 30th of the same month.
TRUE European method. Starting dates and ending dates that occur on the 31st of a month become equal to the 30th of the same month.

## Remark

Dates are stored as sequential serial numbers so they can be used in calculations. By default, December 31, 1899 is serial number 1, and January 1, 2008 is serial number 39448 because it is 39,448 days after January 1, 1900.

## Example

Col1 Col2 Formula Description (Result)

## HOUR

Returns the hour of a time value. The hour is given as an integer, ranging from 0 (12:00 A.M.) to 23 (11:00 P.M.).

## Syntax

HOUR(serial_number)
Serial_number is the time that contains the hour you want to find. Times may be entered as text strings within quotation marks (for example, "6:45 PM"), as decimal numbers (for example, 0.78125, which represents 6:45 PM), or as results of other formulas or functions (for example, TIMEVALUE("6:45 PM")).

## Remark

Time values are a portion of a date value and represented by a decimal number (for example, 12:00 PM is represented as 0.5 because it is half of a day).

## Example

## Formula Description (Result)

=HOUR("3:30:30 AM") Hour of time (3)
=HOUR("3:30:30 PM") Hour of time (15)
=HOUR("15:30") Hour of time (15)

## MINUTE

Returns the minutes of a time value. The minute is given as an integer, ranging from 0 to 59.

## Syntax

MINUTE(serial_number)
Serial_number is the time that contains the minute you want to find. Times may be entered as text strings within quotation marks (for example, "6:45 PM"), as decimal numbers (for example, 0.78125, which represents 6:45 PM), or as results of other formulas or functions (for example, TIMEVALUE("6:45 PM")).

## Remarks

Time values are a portion of a date value and represented by a decimal number (for example, 12:00 PM is represented as 0.5 , since it is half of a day).

## Example

## Formula Description (Result)

=MINUTE("4:48:00 PM") Minutes of the time (48)

## MONTH

Returns the month of a date represented by a serial number. The month is given as an integer, ranging from 1 (January) to 12 (December).

## Syntax

MONTH(serial_number)
Serial_number is the date of the month you are trying to find.

## Remarks

Dates are stored as sequential serial numbers so they can be used in calculations. By default, December 31, 1899 is serial number 1, and January 1, 2008 is serial number 39448 because it is 39,448 days after January 1, 1900.

Values returned by the YEAR, MONTH and DAY functions will be Gregorian values regardless of the display format for the supplied date value. For example, if the display format of the supplied date is Hijri, the returned values for the YEAR, MONTH and DAY functions will be values associated with the equivalent Gregorian date.

## Example

## Formula Description (Result)

=MONTH("15-Apr-2008") Month of the date (4)

## SECOND

Returns the seconds of a time value. The second is given as an integer in the range 0 (zero) to 59 .

## Syntax

## SECOND(serial_number)

Serial_number is the time that contains the seconds you want to find. Times may be entered as text strings within quotation marks (for example, "6:45 PM"), as decimal numbers (for example, 0.78125, which represents 6:45 PM), or as results of other formulas or functions (for example, TIMEVALUE("6:45 PM")).

## Remark

Time values are a portion of a date value and represented by a decimal number (for example, 12:00 PM is represented as 0.5 because it is half of a day).

## Example

## Formula Description <br> =SECOND("4:48:18 PM") Seconds in the time (18) <br> =SECOND("4:48 PM") Seconds in the time (0)

## TIME

Returns the decimal number for a particular time. The decimal number returned by TIME is a value ranging from 0 (zero) to 0.99999999 , representing the times from 0:00:00 (12:00:00 AM) to 23:59:59 (11:59:59 P.M.).

## Syntax

## TIME(hour,minute,second)

Hour is a number from 0 (zero) to 32767 representing the hour. Any value greater than 23 will be divided by 24 and the remainder will be treated as the hour value. For example, $\operatorname{TIME}(27,0,0)=\operatorname{TIME}(3,0,0)=$ . 125 or 3:00 AM.

Minute is a number from 0 to 32767 representing the minute. Any value greater than 59 will be converted to hours and minutes. For example, $\operatorname{TIME}(0,750,0)=\operatorname{TIME}(12,30,0)=.520833$ or 12:30 PM.

Second is a number from 0 to 32767 representing the second. Any value greater than 59 will be converted to hours, minutes, and seconds.
For example, $\operatorname{TIME}(0,0,2000)=\operatorname{TIME}(0,33,22)=.023148$ or 12:33:20 AM

## Remark

Time values are a portion of a date value and represented by a decimal number (for example, 12:00 PM is represented as 0.5 because it is half of a day).

## Example

| Hour | Minute | Second | Formula | Description (Result) |
| :---: | :---: | :---: | :---: | :---: |
| 12 | 0 | 0 | $=$ =TIME ([Hour], [Minute], <br> [Second]) | Decimal representation of the time of day, for the time (0.5) |
| 16 | 48 | 10 | $\begin{aligned} & =\text { =TIME([Hour], } \\ & \text { [Minute], } \\ & \text { [Second]) } \end{aligned}$ | Decimal representation of the time of day, for the time (0.700115741) |

## TIMEVALUE

Returns the decimal number of the time represented by a text string. The decimal number is a value ranging from 0 (zero) to 0.99999999 , representing the times from 0:00:00 (12:00:00 AM) to 23:59:59 (11:59:59 P.M.).

## Syntax

TIMEVALUE(time_text)
Time_text is a text string that represents a time in any one of the spreadsheet time formats; for example, "6:45 PM" and "18:45" text strings within quotation marks that represent time.

## Remarks

Date information in time_text is ignored.

## Example

| Formula | Description (Result) |
| :--- | :--- |
| =TIMEVALUE("2:24 AM") | Decimal part of a day, for the time (0.1) |
| =TIMEVALUE("22-Aug-2008 | Decimal part of a day, for the time |
| 6:35 AM") | $(0.274305556)$ |

## TODAY

Returns the serial number of the current date. The serial number is the date-time code used for date and time calculations.

Note You can only use the TODAY function as a default value; you cannot use it in a calculated column.

Syntax
TODAY
Remark
Dates are stored as sequential serial numbers so they can be used in calculations. By default, December 31, 1899 is serial number 1, and January 1, 2008 is serial number 39448 because it is 39,448 days after January 1, 1900.

## WEEKDAY

Returns the day of the week corresponding to a date. The day is given as an integer, ranging from 1 (Sunday) to 7 (Saturday), by default.

## Syntax

WEEKDAY(serial_number,return_type)
Serial_number is a sequential number that represents the date of the day you are trying to find.

Return_type is a number that determines the type of return value.

## Return_type Number returned

1 or omitted Numbers 1 (Sunday) through 7 (Saturday).
2 Numbers 1 (Monday) through 7 (Sunday).
3 Numbers 0 (Monday) through 6 (Sunday).

## Remark

Dates are stored as sequential serial numbers so they can be used in calculations. By default, December 31, 1899 is serial number 1, and January 1, 2008 is serial number 39448 because it is 39,448 days after January 1, 1900.

## Example

$$
\begin{array}{ll}
\begin{array}{l}
\text { Formula } \\
\text { =WEEKDAY("2/14/2008") }
\end{array} & \begin{array}{l}
\text { Description (Result) } \\
\text { Day of the week, with numbers } 1 \text { (Sunday) } \\
\text { through } 7 \text { (Saturday) (5) }
\end{array} \\
=\text { WEEKDAY(" } 2 / 14 / 2008 \text { ",2) }) & \begin{array}{l}
\text { Day of the week, with numbers } 1 \text { (Monday) } \\
\text { through } 7 \text { (Sunday) (4) }
\end{array} \\
=\text { WEEKDAY("2/14/2008",3) } & \begin{array}{l}
\text { Day of the week, with numbers } 0 \text { (Monday) } \\
\text { through } 6 \text { (Sunday) (3) }
\end{array}
\end{array}
$$

Note $2 / 14 / 2008$ is a Thursday.

## YEAR

Returns the year corresponding to a date.

## Syntax

## YEAR(serial_number)

Serial_number is the date of the year you want to find.

## Remarks

Dates are stored as sequential serial numbers so they can be used in calculations. By default, December 31, 1899 is serial number 1, and January 1, 2008 is serial number 39448 because it is 39,448 days after January 1, 1900.

Values returned by the YEAR, MONTH and DAY functions will be Gregorian values regardless of the display format for the supplied date value. For example, if the display format of the supplied date is Hijri, the returned values for the YEAR, MONTH and DAY functions will be values associated with the equivalent Gregorian date.

## Example

## Formula Description (Result)

$=$ YEAR("7/5/2008") Year of the first date (2008)
$=$ YEAR("7/5/10") Year of the second date (2010)

## DDB

Returns the depreciation of an asset for a specified period using the double-declining balance method or some other method you specify.

## Syntax

DDB(cost,salvage,life,period,factor)
Cost is the initial cost of the asset.
Salvage is the value at the end of the depreciation (sometimes called the salvage value of the asset).

Life is the number of periods over which the asset is being depreciated (sometimes called the useful life of the asset).

Period is the period for which you want to calculate the depreciation. Period must use the same units as life.

Factor is the rate at which the balance declines. If factor is omitted, it is assumed to be 2 (the double-declining balance method).

All five arguments must be positive numbers.

## Remarks

The double-declining balance method computes depreciation at an accelerated rate. Depreciation is highest in the first period and decreases in successive periods. DDB uses the following formula to calculate depreciation for a period:
((cost-salvage) - total depreciation from prior periods) * (factor/life)
Change factor if you do not want to use the double-declining balance method.

## Example

| Cost Salvage |  | Formula | Description (Result) |
| :---: | :---: | :---: | :---: |
| 2400300 | 10 | $\begin{aligned} & =\text { DDB([Cost], } \\ & \text { [Salvage], } \\ & \text { [Life] } \left.{ }^{*} 365,1\right) \end{aligned}$ | First day's depreciation. Factor is automatically assumed to be 2. (1.32) |
| 2400300 | 10 | $=\mathrm{DDB}([\mathrm{Cost}]$, | First month's depreciation (40.00) |


|  |  | [Salvage], <br> [Life]*12,1,2) |
| :---: | :---: | :---: |
| 2400300 | 10 | =DDB([Cost], First year's depreciation (480.00) [Salvage], <br> [Life],1,2) |
| 2400300 | 10 | $=\mathrm{DDB}([$ Cost $]$, Second year's depreciation using a [Salvage], factor of 1.5 instead of the double[Life],2,1.5) declining balance method (306.00) |
| 2400300 | 10 | $=\mathrm{DDB}([\mathrm{Cost}]$, Tenth year's depreciation. Factor is [Salvage], automatically assumed to be 2 (22.12) [Life],10) |

Note The results are rounded to two decimal places.

## FV

Returns the future value of an investment based on periodic, constant payments and a constant interest rate.

## Syntax

FV(rate,nper,pmt,pv,type)
For a more complete description of the arguments in FV and for more information on annuity functions, see PV.

Rate is the interest rate per period.
Nper is the total number of payment periods in an annuity.
Pmt is the payment made each period; it cannot change over the life of the annuity. Typically, pmt contains principal and interest but no other fees or taxes. If pmt is omitted, you must include the pv argument.

Pv is the present value, or the lump-sum amount that a series of future payments is worth right now. If pv is omitted, it is assumed to be 0 (zero), and you must include the pmt argument.

Type is the number 0 or 1 and indicates when payments are due. If type is omitted, it is assumed to be 0 .

## Set type equal to If payments are due

0 At the end of the period

## 1 <br> At the beginning of the period

## Remarks

Make sure that you are consistent about the units you use for specifying rate and nper. If you make monthly payments on a four-year loan at 12 percent annual interest, use 12\%/12 for rate and $4 \star 12$ for nper. If you make annual payments on the same loan, use $12 \%$ for rate and 4 for nper.

For all the arguments, cash you pay out, such as deposits to savings, is represented by negative numbers; cash you receive, such as dividend checks, is represented by positive numbers.

## Example 1

## Rate Nper Pmt PV Type Formula Description (Result)

 $6 \% \quad 10 \quad-200-5001 \quad=F V($ Rate/12, Future value of an investment Nper, Pmt, PV, with the specified arguments Type) (2581.40)Note The annual interest rate is divided by 12 because it is compounded monthly.

## Example 2

## Rate Nper Pmt Formula Description (Result)

$12 \% 12-1000=F V([$ Rate $] / 12$, Future value of an investment with the [Nper], [Pmt]) specified arguments $(12,682.50)$

Note The annual interest rate is divided by 12 because it is compounded monthly.

## IPMT

Returns the interest payment for a given period for an investment based on periodic, constant payments and a constant interest rate. For a more complete description of the arguments in IPMT and for more information about annuity functions, see the PV function.

## Syntax

IPMT(rate,per,nper,pv,fv,type)
Rate is the interest rate per period.
Per is the period for which you want to find the interest and must be in the range 1 to nper.

Nper is the total number of payment periods in an annuity.
Pv is the present value, or the lump-sum amount that a series of future payments is worth right now.

Fv is the future value, or a cash balance you want to attain after the last payment is made. If fv is omitted, it is assumed to be 0 (the future value of a loan, for example, is 0 ).

Type is the number 0 or 1 and indicates when payments are due. If type is omitted, it is assumed to be 0 .

## Set type equal to If payments are due

| 0 | At the end of the period |
| :--- | :--- |
| 1 | At the beginning of the period |

## Remarks

Make sure that you are consistent about the units you use for specifying rate and nper. If you make monthly payments on a four-year loan at 12 percent annual interest, use $12 \% / 12$ for rate and $4 * 12$ for nper. If you make annual payments on the same loan, use $12 \%$ for rate and 4 for nper.

For all the arguments, cash you pay out, such as deposits to savings, is represented by negative numbers; cash you receive, such as dividend checks, is represented by positive numbers.

## Example

| Rate | eriod | per | PV | Formula | Description (Result) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 10\% | 1 | 3 |  | =IPMT([R [Period]*3 [Nper], | Interest due in the first month for a loan with the specified arguments (-22.41) |
| 10\% | 1 | 3 |  | =IPMT( <br> Nper, [P | Interest due in the last year for a loan with the specified arguments, where payments are made yearly (-292.45) |

Note The interest rate is divided by 12 to get a monthly rate. The years the money is paid out is multiplied by 12 to get the number of payments.

## ISPMT

Calculates the interest paid during a specific period of an investment.

## Syntax

## ISPMT(rate,per,nper,pv)

Rate is the interest rate for the investment.
Per is the period for which you want to find the interest, and must be between 1 and nper.

Nper is the total number of payment periods for the investment.
Pv is the present value of the investment. For a loan, pv is the loan amount.

## Remarks

Make sure that you are consistent about the units you use for specifying rate and nper. If you make monthly payments on a four-year loan at an annual interest rate of 12 percent, use $12 \% / 12$ for rate and $4 * 12$ for nper. If you make annual payments on the same loan, use $12 \%$ for rate and 4 for nper.

For all the arguments, the cash you pay out, such as deposits to savings or other withdrawals, is represented by negative numbers; the cash you receive, such as dividend checks and other deposits, is represented by positive numbers.

For additional information about financial functions, see the PV function.

## Example

| Rate Pe | per | PV | Formula | Description (Result) |
| :---: | :---: | :---: | :---: | :---: |
| 10\% 1 | 3 |  | $\begin{aligned} & {[\mathrm{Per}],[\mathrm{Npt}} \\ & [\mathrm{PV}]) \end{aligned}$ | Interest paid for the first monthly payment of a loan with the specified arguments (-64814.8) |
| 10\% 1 | 3 |  | =ISPMT [Nper],[P | Interest paid in the first year of a loan with the specified arguments (-533333) |

Note The interest rate is divided by 12 to get a monthly rate. The years the money is paid out is multiplied by 12 to get the number of payments.

## NPER

Returns the number of periods for an investment based on periodic, constant payments and a constant interest rate.

## Syntax

NPER(rate, pmt, pv, fv, type)
For a more complete description of the arguments in NPER and for more information about annuity functions, see PV.

Rate is the interest rate per period.
Pmt is the payment made each period; it cannot change over the life of the annuity. Typically, pmt contains principal and interest but no other fees or taxes.

Pv is the present value, or the lump-sum amount that a series of future payments is worth right now.

Fv is the future value, or a cash balance you want to attain after the last payment is made. If fv is omitted, it is assumed to be 0 (the future value of a loan, for example, is 0 ).

Type is the number 0 or 1 and indicates when payments are due.

## Set type equal to If payments are due

0 or omitted At the end of the period
1 At the beginning of the period

## Example

| Rate Pmt PV | FV | Type | Formula | Description (Result) |
| :---: | :---: | :---: | :---: | :---: |
| 12\% -100-1000 | 10000 | 1 | =NPER([Rate]/12, [Pmt], [PV], [FV], 1) | Periods for the investment with the specified arguments (60) |
| 12\% - 100-1000 | 10000 | 1 | =NPER([Rate]/12, <br> [Pmt], [PV], [FV]) | Periods for the investment with the specified arguments, except payments are made at the beginning of |

the period (60)
12\%-100-1000 10000 $1=$ NPER([Rate]/12, Periods for the [Pmt], [PV]) investment with the specified arguments, except with a future value of $0(-9.578)$

## NPV

Calculates the net present value of an investment by using a discount rate and a series of future payments (negative values) and income (positive values).

## Syntax

NPV(rate, value1, value2, ...)
Rate is the rate of discount over the length of one period.
Value1, value2, $\ldots$ are 1 to 29 arguments representing the payments and income.

Value1, value2, ... must be equally spaced in time and occur at the end of each period.

NPV uses the order of value1, value2, ... to interpret the order of cash flows. Be sure to enter your payment and income values in the correct sequence.

Arguments that are numbers, empty, logical values, or text representations of numbers are counted; arguments that are error values or text that cannot be translated into numbers are ignored.

## Remarks

The NPV investment begins one period before the date of the value1 cash flow and ends with the last cash flow in the list. The NPV calculation is based on future cash flows. If your first cash flow occurs at the beginning of the first period, the first value must be added to the NPV result, not included in the values arguments. For more information, see the examples below.

If n is the number of cash flows in the list of values, the formula for NPV is:
$\mathrm{NPV}=\sum_{j=1}^{n} \frac{\text { values }_{j}}{\left(1+\text { rate }^{\prime}\right)^{\prime}}$
NPV is similar to the PV function (present value). The primary difference between PV and NPV is that PV allows cash flows to begin either at the end or at the beginning of the period. Unlike the variable NPV cash flow
values, PV cash flows must be constant throughout the investment. For information about annuities and financial functions, see PV.

NPV is also related to the IRR function (internal rate of return). IRR is the rate for which NPV equals zero: NPV(IRR(...), ...) = 0 .

## Example 1

In the following example:
Rate is the annual discount rate.
Value1 is the initial cost of investment one year from today.
Value2 is the return from first year.
Value3 is the return from second year.
Value4 is the return from third year.

| Rate | Value1 | Value2 | Value3 | Value4 | Formula | Description (Result) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 10\% | -10000 | 3000 | 4200 | 6800 | =NPV([Rate], <br> [Value1], [Value2], <br> [Value3], [Value4]) | Net present value of this investment $(1,188.44)$ |

In the preceding example, you include the initial $\$ 10,000$ cost as one of the values, because the payment occurs at the end of the first period.

## Example 2

In the following example:
Rate is the annual discount rate. This might represent the rate of inflation or the interest rate of a competing investment.

Value1 is the initial cost of investment one year from today.
Value2 is the return from first year.
Value3 is the return from second year.
Value4 is the return from third year.

Value5 is the return from fourth year.
Value6 is the return from fifth year.

| Rate | Value1 | Value2 | Value3 | Value4 | Value5 | Value6 | Formula | Descript (Result) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 8\% | 40000 | 8000 | 9200 | 10000 | 12000 | 14500 | =NPV(Rate, [Value2], [Value3], [Value4], [Value5], [Value6])+ [Value1] | Net pres value of investme (1,922.0 |
| 8\% | 40000 | 8000 | 9200 | 10000 | 12000 | 14500 | =NPV(Rate, [Value2], <br> [Value3], <br> [Value4], <br> [Value5], <br> [Value6], <br> -9000)+ <br> [Value1] | Net pres value of investme with a los in the six year of 9000 (-3,749.4 |

In the preceding example, you don't include the initial \$40,000 cost as one of the values, because the payment occurs at the beginning of the first period.

## PMT

Calculates the payment for a loan based on constant payments and a constant interest rate.

## Syntax

PMT(rate,nper,pv,fv,type)
For a more complete description of the arguments in PMT, see the PV function.

Rate is the interest rate for the loan.
Nper is the total number of payments for the loan.
Pv is the present value, or the total amount that a series of future payments is worth now; also known as the principal.
Fv is the future value, or a cash balance you want to attain after the last payment is made. If fv is omitted, it is assumed to be 0 (zero), that is, the future value of a loan is 0 .

Type is the number 0 (zero) or 1 and indicates when payments are due.

## Set type equal to If payments are due

0 or omitted At the end of the period
1 At the beginning of the period
Remarks
The payment returned by PMT includes principal and interest but no taxes, reserve payments, or fees sometimes associated with loans.

Make sure that you are consistent about the units you use for specifying rate and nper. If you make monthly payments on a four-year loan at an annual interest rate of 12 percent, use $12 \% / 12$ for rate and $4 * 12$ for nper. If you make annual payments on the same loan, use 12 percent for rate and 4 for nper.

- Tip


## Example 1

In the following example:

Rate is the annual interest rate
Nper is the number of months of payments
$\mathbf{P V}$ is the amount of loan
Rate Nper PV Formula Description (Result)
$8 \% 1010000=\mathrm{PMT}([$ Rate $] / 12$, Monthly payment for a loan with the [Nper], [PV]) specified arguments ( $-1,037.03$ )
$8 \% 10 \quad 10000=\mathrm{PMT}([$ Rate $] / 12$, Monthly payment for a loan with the [Nper], [PV], 0, specified arguments, except

1) payments are due at the beginning of the period $(-1,030.16)$

## Example 2

You can use PMT to determine payments to annuities other than loans.
In the following example:
Rate is the annual interest rate.
Nper is the years you plan on saving.
PV is the amount you want to have save in 18 years.
Rate Nper PV Formula Description (Result)
$6 \% 1850000=$ PMT ([Rate]/12, Amount to save each month to have [Nper]*12, 0, 50,000 at the end of 18 years [PV]) (-129.08)

Note The interest rate is divided by 12 to get a monthly rate. The years the money is paid out is multiplied by 12 to get the number of payments.

## PPMT

Returns the payment on the principal for a given period for an investment based on periodic, constant payments and a constant interest rate.

## Syntax

PPMT(rate,per,nper,pv,fv,type)
For a more complete description of the arguments in PPMT, see PV.
Rate is the interest rate per period.
Per specifies the period and must be in the range 1 to nper.
Nper is the total number of payment periods in an annuity.
Pv is the present value- the total amount that a series of future payments is worth now.

Fv is the future value, or a cash balance you want to attain after the last payment is made. If fv is omitted, it is assumed to be 0 (zero), that is, the future value of a loan is 0 .

Type is the number 0 or 1 and indicates when payments are due.

## Set type equal to If payments are due

0 or omitted At the end of the period
1 At the beginning of the period

## Remark

Make sure that you are consistent about the units you use for specifying rate and nper. If you make monthly payments on a four-year loan at 12 percent annual interest, use $12 \% / 12$ for rate and $4 * 12$ for nper. If you make annual payments on the same loan, use $12 \%$ for rate and 4 for nper.

## Example 1

| Rate Nper | PV | Formula | Description (Result) |
| :---: | :---: | :---: | :---: |
| 10\% 2 |  | =PPMT([R <br> [Nper]*12 | Payment on principle for the first month of loan (-75.62) |

Note The interest rate is divided by 12 to get a monthly rate. The years the money is paid out is multiplied by 12 to get the number of payments.

## Example 2

## Rate Per PV Formula Description (Result)

8\% $10200,000=$ PPMT([Rate], Principal payment for the last year of [Per], 10, [PV]) the loan with the specified arguments $(-27,598.05)$

## PV

Returns the present value of an investment. The present value is the total amount that a series of future payments is worth now. For example, when you borrow money, the loan amount is the present value to the lender.

## Syntax

## PV(rate,nper,pmt,fv,type)

Rate is the interest rate per period. For example, if you obtain an automobile loan at a 10 percent annual interest rate and make monthly payments, your interest rate per month is $10 \% / 12$, or $0.83 \%$. You would enter $10 \% / 12$, or $0.83 \%$, or 0.0083 , into the formula as the rate.

Nper is the total number of payment periods in an annuity. For example, if you get a four-year car loan and make monthly payments, your loan has 4*12 (or 48) periods. You would enter 48 into the formula for nper.

Pmt is the payment made each period and cannot change over the life of the annuity. Typically, pmt includes principal and interest but no other fees or taxes. For example, the monthly payments on a $\$ 10,000$, fouryear car loan at 12 percent are $\$ 263.33$. You would enter -263.33 into the formula as the pmt. If pmt is omitted, you must include the fv argument.
Fv is the future value, or a cash balance you want to attain after the last payment is made. If fv is omitted, it is assumed to be 0 (the future value of a loan, for example, is 0 ). For example, if you want to save $\$ 50,000$ to pay for a special project in 18 years, then $\$ 50,000$ is the future value. You could then make a conservative guess at an interest rate and determine how much you must save each month. If fv is omitted, you must include the pmt argument.

Type is the number 0 or 1 and indicates when payments are due.

## Set type equal to If payments are due

0 or omitted At the end of the period
1 At the beginning of the period

## Remarks

Make sure that you are consistent about the units you use for specifying
rate and nper. If you make monthly payments on a four-year loan at 12 percent annual interest, use $12 \% / 12$ for rate and $4 * 12$ for nper. If you make annual payments on the same loan, use $12 \%$ for rate and 4 for nper.

The following functions apply to annuities:
FV
IPMT
PMT
PPMT

## PV

RATE
An annuity is a series of constant cash payments made over a continuous period. For example, a car loan or a mortgage is an annuity. For more information, see the description for each annuity function.

In annuity functions, cash you pay out, such as a deposit to savings, is represented by a negative number; cash you receive, such as a dividend check, is represented by a positive number. For example, a \$1,000 deposit to the bank would be represented by the argument -1000 if you are the depositor and by the argument 1000 if you are the bank.

One financial argument is solved in terms of the others. If rate is not 0 , then:
$p v^{*}(1+\text { rate })^{\text {mper }}+p m t\left(1+\text { rate }{ }^{*} \text { ope }\right)^{*}$

$$
\left(\frac{(1+\text { rate })^{\text {rper }}-1}{\text { rate }}\right)+j v=0
$$

If rate is 0 , then:

$$
(p m t * n p e r)+p v+f v=0
$$

## Example

In the following example:
Pmt is the money paid out of an insurance annuity at the end of every month.

Rate is the interest rate earned on the money paid out.
Nper is the years the money will be paid out.

## Pmt Rate Nper Formula Description (Result)

500 8\% $20=\mathrm{PV}([$ Rate $] / 12,12 *$ Present value of an annuity with the [Nper], [Pmt], , 0) specified arguments (-59,777.15).

The result is negative because it represents money that you would pay, an outgoing cash flow. If you are asked to pay $(60,000)$ for the annuity, you would determine this would not be a good investment because the present value of the annuity $(59,777.15)$ is less than what you are asked to pay.

Note The interest rate is divided by 12 to get a monthly rate. The years the money is paid out is multiplied by 12 to get the number of payments.

## RATE

Returns the interest rate per period of an annuity. RATE is calculated by iteration and can have zero or more solutions. If the successive results of RATE do not converge to within 0.0000001 after 20 iterations, RATE returns the \#NUM! error value.

## Syntax

RATE(nper,pmt,pv,fv,type,guess)
For a complete description of the arguments nper, pmt, pv, fv, and type, see PV.

Nper is the total number of payment periods in an annuity.
Pmt is the payment made each period and cannot change over the life of the annuity. Typically, pmt includes principal and interest but no other fees or taxes. If pmt is omitted, you must include the fv argument.
Pv is the present value- the total amount that a series of future payments is worth now.
Fv is the future value, or a cash balance you want to attain after the last payment is made. If fv is omitted, it is assumed to be 0 (the future value of a loan, for example, is 0 ).
Type is the number 0 or 1 and indicates when payments are due.

## Set type equal to If payments are due <br> 0 or omitted At the end of the period <br> 1 At the beginning of the period

Guess is your guess for what the rate will be.
If you omit guess, it is assumed to be 10 percent.
If RATE does not converge, try different values for guess. RATE usually converges if guess is between 0 and 1 .

## Remark

Make sure that you are consistent about the units you use for specifying guess and nper. If you make monthly payments on a four-year loan at 12
percent annual interest, use 12\%/12 for guess and $4 * 12$ for nper. If you make annual payments on the same loan, use $12 \%$ for guess and 4 for nper.

## Example

## Nper Pmt PV Formula Description (Result)

$4-2008000=$ RATE ([Nper]*12, Monthly rate of the loan with the [Pmt], [PV]) specified arguments (1\%)
$4-2008000=\operatorname{RATE}\left([\text { Nper }]^{\star} 12\right.$, Annual rate of the loan with the [Pmt], [PV])*12 specified arguments (0.09241767 or 9.24\%)

Note The years of the loan is multiplied by 12 to get the number of months.

## SLN

Returns the straight-line depreciation of an asset for one period.

## Syntax

## SLN(cost,salvage,life)

Cost is the initial cost of the asset.
Salvage is the value at the end of the depreciation (sometimes called the salvage value of the asset).

Life is the number of periods over which the asset is depreciated (sometimes called the useful life of the asset).

## Example

| Cost | Salvage Life Formula | Description (Result) |  |
| :--- | :--- | :--- | :--- |
| $30,0007,500$ | 10 | $=$ SLN([Cost], | The depreciation allowance for |
|  |  | $[$ Salvage], [Life]) | each year $(2,250)$ |

## SYD

Returns the sum-of-years' digits depreciation of an asset for a specified period.

## Syntax

## SYD(cost,salvage,life,per)

Cost is the initial cost of the asset.
Salvage is the value at the end of the depreciation (sometimes called the salvage value of the asset).

Life is the number of periods over which the asset is depreciated (sometimes called the useful life of the asset).

Per is the period and must use the same units as life.

## Remark

SYD is calculated as follows:

$$
S Y D=\frac{(\cos t-s a l v a g e) *(\text { life }- \text { per }+1) * 2}{(\text { life })(\text { life }+1)}
$$

## Example

| Cost Salvage | Life | Formula | Description (Result) |
| :---: | :---: | :--- | :--- |
| 300007500 | 10 | $=$ SYD([Cost], |  |
|  | [Salvage],[Life],1) |  |  | | Yearly depreciation allowance for |
| :--- |
| the first year (4,090.91) |

## IS

This section describes the eight functions used for testing the type of a value or column reference.

Each of these functions, referred to collectively as the IS functions, checks the type of value and returns TRUE or FALSE depending on the outcome. For example, the ISBLANK function returns the logical value TRUE if value is a column reference that is empty; otherwise it returns FALSE.

## Syntax

ISBLANK(value)
ISERR(value)
ISERROR(value)
ISLOGICAL(value)
ISNA(value)
ISNONTEXT(value)
ISNUMBER(value)
ISTEXT(value)
Value is the value you want tested. Value can be blank, error, logical, text, number, or column reference.

| Function | Returns TRUE if |
| :--- | :--- |
| ISBLANK | Value refers to an empty column reference. |
| ISERR | Value refers to any error value except \#N/A. |
| ISERROR | Value refers to any error value (\#N/A, \#VALUE!, \#REF!, <br> \#DIV/0!, \#NUM!, \#NAME?, or \#NULL!). |
| ISLOGICAL | Value refers to a logical value. |
| ISNA | Value refers to the \#N/A (value not available) error value. <br> ISNONTEXTValue refers to any item that is not text. (Note that this <br> function returns TRUE if value refers to a blank column <br> reference.) |
| ISNUMBER | Value refers to a number. |
| ISTEXT | Value refers to text. |

## Remarks

The value arguments of the IS functions are not converted. For example, in most other functions where a number is required, the text value "19" is converted to the number 19. However, in the formula ISNUMBER("19"), "19" is not converted from a text value, and the ISNUMBER function returns FALSE.

The IS functions are useful in formulas for testing the outcome of a calculation. When combined with the IF function, they provide a method for locating errors in formulas (see the following examples).

## Example 1

## Formula Description (Result)

=ISLOGICAL(TRUE) Checks whether TRUE is a logical value (TRUE)
=ISLOGICAL("TRUE") Checks whether "TRUE" is a logical value (FALSE)
=ISNUMBER(4) Checks whether 4 is a number (TRUE)

## Example 2

| Col1 | Formula | Description (Result) |
| :--- | :--- | :--- |
| Gold | ISBLANK([Col1]) | Checks whether the value in Col1 is blank <br> (FALSE) |
| \#REF! $=$ ISERROR([Col1]) | Checks whether \#the value in Col1 is an <br> error (TRUE) |  |
| \#REF! $=$ ISNA([Col1]) | Checks whether the value in Col1 is the <br> \#N/A error (FALSE) |  |
| \#N/A $=$ ISNA([Col1]) | Checks whether the value in Col1is the <br> \#N/A error (TRUE) |  |
| \#N/A $=$ ISERR([Col1]) | Checks whether the value in Col1 is an <br> error (FALSE) |  |
| $330.92=$ ISNUMBER([Col1])Checks whether the value in Col1 is a <br> number (TRUE) |  |  |
| Region1 =ISTEXT([Col1]) | Checks whether the value in Col1 is text <br> (TRUE) |  |

## Me

Returns the current user name.

## Syntax

Me

## Remarks

The Me function can only be used with default values; you cannot use the Me function in a calculated column.

## FALSE

Returns the logical value FALSE.

## Syntax

FALSE()

## Remark

You can also type the word FALSE directly into the formula, and it is interpreted as the logical value FALSE.

## IF

Returns one value if a condition you specify evaluates to TRUE and another value if it evaluates to FALSE.

Use IF to conduct conditional tests on values and formulas.

## Syntax

IF(logical_test,value_if_true,value_if_false)
Logical_test is any value or expression that can be evaluated to TRUE or FALSE. For example, [Quarter1]=100 is a logical expression; if the value in one row of the column, [Quarter1], is equal to 100, the expression evaluates to TRUE. Otherwise, the expression evaluates to FALSE. This argument can use any comparison calculation operator.

Value_if_true is the value that is returned if logical_test is TRUE. For example, if this argument is the text string "Within budget" and the logical_test argument evaluates to TRUE, then the IF function displays the text "Within budget". If logical_test is TRUE and value_if_true is blank, this argument returns 0 (zero). To display the word TRUE, use the logical value TRUE for this argument. Value_if_true can be another formula.

Value_if_false is the value that is returned if logical_test is FALSE. For example, if this argument is the text string "Over budget" and the logical_test argument evaluates to FALSE, then the IF function displays the text "Over budget". If logical_test is FALSE and value_if_false is omitted, (that is, after value_if_true, there is no comma), then the logical value FALSE is returned. If logical_test is FALSE and value_if_false is blank (that is, after value_if_true, there is a comma followed by the closing parenthesis), then the value 0 (zero) is returned. Value_if_false can be another formula.

## Remarks

Up to seven IF functions can be nested as value_if_true and value_if_false arguments to construct more elaborate tests. See the last of the following examples.

When the value_if_true and value_if_false arguments are evaluated, IF returns the value returned by those statements.

If any of the arguments to IF are arrays, every element of the array is evaluated when the IF statement is carried out.

## Example 1

| Col | Col2 | Col3 | Expense | Formula | Description (Result) |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | 50 | =IF([Expense]<=100,"Within budget","Over budget") | If the number is less than or equal to 100 , then the formula displays "Within budget". Otherwise, the function displays "Over budget". (Within budget) |
| 23 | 45 | 89 | 50 | $\begin{aligned} & \text { =IF([Expense]=100,SUM([Col1], } \\ & \text { [Col2],[Col3]),"'") } \end{aligned}$ | If the number is 100 , then the three values are added. Otherwise, empty text ("'") is returned. () |

## Example 2

| ActualExpenses PredictedExpenses | Formula | Descr <br> (Resu |  |
| :--- | :--- | :--- | :--- |
| 1500 |  | IF([ActualExpenses]> | Check |
|  | [PredictedExpenses],"Over wheth, |  |  |
|  | Budget","OK") | first ro |  |



## Example 3

$$
\begin{array}{lll}
\text { Score } & \text { Formula } & \text { Description (Result) } \\
45 & \text { IF([Score]>89,"A",IF([Score]>79,"B", } & \text { Assigns a letter grade } \\
& \text { IF([Score]>69,"C",IF([Score]>59,"D","F")))) to the first score (F) } \\
\hline 90 & \text { IF([Score]>89,"A",IF([Score]>79,"B", } & \text { Assigns a letter grade } \\
& \text { IF([Score]>69,"C",IF([Score]>59,"D","F")))) to the second score } \\
& & \text { (A) } \\
\hline 78 & \text { IF([Score]>89,"A",IF([Score]>79,"B", } & \text { Assigns a letter grade } \\
& \text { IF([Score]>69,"C",IF([Score]>59,"D","F")))) to the third score (C) }
\end{array}
$$

In the preceding example, the second IF statement is also the value_if_false argument to the first IF statement. Similarly, the third IF statement is the value_if_false argument to the second IF statement. For example, if the first logical_test ([Score]>89) is TRUE, "A" is returned. If the first logical_test is FALSE, the second IF statement is evaluated, and so on.

The letter grades are assigned to numbers using the following key (assuming use of integers only).

## If Score is Then return

Greater than 89 A
From 80 to 89 B
From 70 to 79 C
From 60 to 69 D
Less than 60 F

## NOT

Reverses the value of its argument. Use NOT when you want to make sure a value is not equal to one particular value.

## Syntax

NOT(logical)
Logical is a value or expression that can be evaluated to TRUE or FALSE.

## Remark

If logical is FALSE, NOT returns TRUE; if logical is TRUE, NOT returns FALSE.

## Example

| Formula | Description (Result) |
| :--- | :--- |
| =NOT(FALSE) | Reverses FALSE (TRUE) |
| =NOT(1+1=2) | Reverses an equation that evaluates to TRUE (FALSE) |

## OR

Returns TRUE if any argument is TRUE; returns FALSE if all arguments are FALSE.

## Syntax

OR(logical1,logical2,...)
Logical1, logical2, ... are 1 to 30 conditions you want to test that can be either TRUE or FALSE.

## Remarks

The arguments must evaluate to logical values such as TRUE or FALSE, or be arrays or references that contain logical values.

If a column reference argument contains text or is empty, those values are ignored.

If the specified range contains no logical values, OR returns the \#VALUE! error value.

## Example

| Formula | Description (Result) |
| :--- | :--- |
| $=O R(T R U E)$ One argument is TRUE (TRUE) <br> $=O R(1+1=1,2+2=5)$ All arguments evaluate to FALSE (FALSE) <br> $=O R(T R U E, F A L S E, T R U E)$ At least one argument is TRUE (TRUE) |  |

## TRUE

Returns the logical value TRUE.

## Syntax

TRUE()

## Remark

You can enter the value TRUE directly without using this function. The TRUE function is provided primarily for compatibility with other programs.

## AND

Returns TRUE if all its arguments are TRUE; returns FALSE if one or more argument is FALSE.

## Syntax

AND(logical1,logical2,...)
Logical1, logical2, ... are 1 to 30 conditions you want to test that can be either TRUE or FALSE.

## Remarks

The arguments must evaluate to logical values such as TRUE or FALSE, or the arguments must be column references that contain logical values.

If a column reference argument contains text, AND returns the \#VALUE! error value; if it is empty, it returns FALSE.

If the arguments contain no logical values, AND returns the \#VALUE! error value.

## Example 1

## Formula Description (Result)

=AND(TRUE, TRUE) All arguments are TRUE (TRUE)
=AND(TRUE, FALSE) One argument is FALSE (FALSE)
$=A N D(2+2=4,2+3=5)$ All arguments evaluate to TRUE (TRUE)

## Example 2

Col1 Col2 Formula Description (Result)
$50104=A N D(1<[C o l 1]$, [Col1] Because 50 is between 1 and 100 $<100$ ) (TRUE)
50104 =IF(AND(1<[Col2], Displays the second number, if it is [Col2]<100), [Col2], "The value is out of range.") between 1 and 100, otherwise displays a message (The value is out of range.)
$50104=\operatorname{IF}(\operatorname{AND}(1<[C o l 1], \quad$ Displays the first number, if it is [Col1]<100), [Col1], between 1 and 100, otherwise
"The value is out of range.")

## CHOOSE

Uses index_num to return a value from the list of value arguments. Use CHOOSE to select one of up to 29 values based on the index number. For example, if value1 through value7 are the days of the week, CHOOSE returns one of the days when a number between 1 and 7 is used as index_num.

## Syntax

CHOOSE(index_num,value1,value2,...)
Index_num specifies which value argument is selected. Index_num must be a number between 1 and 29, or a formula or column reference containing a number between 1 and 29.

If index_num is 1, CHOOSE returns value1; if it is 2, CHOOSE returns value2; and so on.

If index_num is less than 1 or greater than the number of the last value in the list, CHOOSE returns the \#VALUE! error value.

If index_num is a fraction, it is truncated to the lowest integer before being used.

Value1,value2,... are 1 to 29 value arguments from which CHOOSE selects a value or an action to perform based on index_num. The arguments can be numbers, column references, formulas, functions, or text.

## Remarks

## Example 1

Col1 Col2 Col3 Col4 Formula Description (Result)

1st 2nd 3rd Finished $=\operatorname{CHOOSE}(2,[$ Col1], Value from the second [Col2],[Col3],[Col4]) argument Col2 (2nd)
Nails Screws Nuts Bolts =CHOOSE(4,[Col1], Value from the fourth [Col2],[Col3],[Col4]) argument Col4 (Bolts)

## Example 2

$23 \quad 45 \quad 12 \quad 10 \quad=$ SUM $([$ Col1 $]$, $\quad$ Sums the two arguments Col1 CHOOSE(2,[Col2], and the result of the Choose [Col3],[Col4])) function (35)

## ABS

Returns the absolute value of a number. The absolute value of a number is the number without its sign.

## Syntax

ABS(number)
Number is the real number of which you want the absolute value.

## Examples

## Col1 Formula Description (Result)

$-4 \quad=\mathrm{ABS}([\mathrm{Col} 1])$ Absolute value of -4 (4)

## ACOS

Returns the arccosine, or inverse cosine, of a number. The arccosine is the angle whose cosine is number. The returned angle is given in radians in the range 0 (zero) to pi.

## Syntax

## ACOS(number)

Number is the cosine of the angle you want and must be from -1 to 1 .
Remark
If you want to convert the result from radians to degrees, multiply it by $180 / \mathrm{PI}()$ or use the DEGREES function.

## Example

| Formula | Description (Result) |
| :--- | :--- |
| $=\operatorname{ACOS}(-0.5)$ | Arccosine of -0.5 in radians, $2 * \mathrm{pi} / 3(2.094395)$ |
| $=\mathrm{ACOS}(-0.5)^{\star 180 / \mathrm{PI}()}$ | Arccosine of -0.5 in degrees (120) |
| $=$ DEGREES $(\mathrm{ACOS}(-0.5))$ | Arccosine of -0.5 in degrees (120) |

## ACOSH

Returns the inverse hyperbolic cosine of a number. Number must be greater than or equal to 1 . The inverse hyperbolic cosine is the value whose hyperbolic cosine is number, so $\mathrm{ACOSH}(\mathrm{COSH}$ (number)) equals number.

## Syntax

## ACOSH(number)

Number is any real number equal to or greater than 1.

## Example

Formula Description (Result)
=ACOSH(1) Inverse hyperbolic cosine of 1 (0)
=ACOSH(10) Inverse hyperbolic cosine of 10 (2.993223)

## ASIN

Returns the arcsine, or inverse sine, of a number. The arcsine is the angle whose sine is number. The returned angle is given in radians in the range -pi/2 to pi/2.

## Syntax

ASIN(number)
Number is the sine of the angle you want and must be from -1 to 1 .
Remark
To express the arcsine in degrees, multiply the result by $180 / \mathrm{PI}()$ or use the DEGREES function.

| Formula | Description (Result) |
| :---: | :---: |
| =ASIN(-0.5) | Arcsine of -0.5 in radians, -pi/6 (-0.5236) |
| =ASIN(-0.5)*180/PI() | Arcsine of -0.5 in degrees (-30) |
| =DEGREES(ASIN(-0.5)) | Arcsine of -0.5 in degrees (-30) |

## ASINH

Returns the inverse hyperbolic sine of a number. The inverse hyperbolic sine is the value whose hyperbolic sine is number, so ASINH(SINH(number)) equals number.

## Syntax

## ASINH(number)

Number is any real number.

## Example

Formula Description (Result)
$=A S I N H(-2.5)$ Inverse hyperbolic sine of -2.5 (-1.64723)
$=A S I N H(10)$ Inverse hyperbolic sine of 10 (2.998223)

## ATAN

Returns the arctangent, or inverse tangent, of a number. The arctangent is the angle whose tangent is number. The returned angle is given in radians in the range -pi/2 to pi/2.

## Syntax

## ATAN (number)

Number is the tangent of the angle you want.

## Remark

To express the arctangent in degrees, multiply the result by $180 / \mathrm{PI}()$ or use the DEGREES function.

## Example

| Formula | Description (Result) |
| :--- | :--- |
| $=A T A N(1)$ | Arctangent of 1 in radians, pi/4 (0.785398) |
| $=A T A N(1) \star 180 / \mathrm{PI}()$ | Arctangent of 1 in degrees (45) |
| =DEGREES(ATAN(1)) | Arctangent of 1 in degrees (45) |

## ATAN2

Returns the arctangent, or inverse tangent, of the specified $x$ - and $y$ coordinates. The arctangent is the angle from the $x$-axis to a line containing the origin $(0,0)$ and a point with coordinates ( $x \_n u m, y \_n u m$ ). The angle is given in radians between -pi and pi, excluding -pi.

## Syntax

ATAN2(x_num,y_num)
$X \_n u m$ is the $x$-coordinate of the point.
Y_num is the $y$-coordinate of the point.

## Remarks

A positive result represents a counterclockwise angle from the $x$-axis; a negative result represents a clockwise angle.

ATAN2(a,b) equals ATAN(b/a), except that a can equal 0 in ATAN2.
If both $x$ _num and $y$ _num are 0 , ATAN2 returns the \#DIV/O! error value.
To express the arctangent in degrees, multiply the result by 180/PI( ) or use the DEGREES function.

## Example

| Formula | Description (Result) |
| :---: | :---: |
| =ATAN2 $(1,1)$ | Arctangent of the point 1,1 in radians, pi/4 (0.785398) |
| =ATAN2(-1, -1) | Arctangent of the point $-1,-1$ in radians, $-3^{*} \mathrm{pi} / 4$ (-2.35619) |
| $\begin{aligned} & =\text { ATAN2(-1, } \\ & -1)^{*} 180 / \mathrm{PI}() \end{aligned}$ | Arctangent of the point 1,1 in degrees (-135) |
| $\begin{aligned} & \text { =DEGREES(AT } \\ & \text {-1)) } \end{aligned}$ | Arctangent of the point 1,1 in degrees (-135) |

## ATANH

Returns the inverse hyperbolic tangent of a number. Number must be between -1 and 1 (excluding -1 and 1). The inverse hyperbolic tangent is the value whose hyperbolic tangent is number; ATANH(TANH(number)) equals number.

## Syntax

## ATANH(number)

Number is any real number between 1 and -1 .

## Example

| Formula | Description (Result) |
| :--- | :--- |
| $=$ ATANH(0.76159416) | Inverse hyperbolic tangent of $0.76159416(1$, <br> approximately) |
| $=A T A N H(-0.1)$ | Inverse hyperbolic tangent of $-0.1(-0.10034)$ |

## CEILING

Returns number rounded up, away from zero, to the nearest multiple of significance. For example, if you want to avoid using pennies in your prices and your product is priced at $\$ 4.42$, use the formula $=$ CEILING(4.42,0.05) to round prices up to the nearest nickel.

## Syntax

CEILING(number,significance)
Number is the value you want to round.
Significance is the multiple to which you want to round.

## Remarks

If either argument is nonnumeric, CEILING returns the \#VALUE! error value.

Regardless of the sign of number, a value is rounded up when adjusted away from zero. If number is an exact multiple of significance, no rounding occurs.

If number and significance have different signs, CEILING returns the \#NUM! error value.

## Example

## Formula Description (Result)

$=$ CEILING $(2.5,1)$ Rounds 2.5 up to nearest multiple of 1 (3)
$=$ CEILING $(-2.5, \quad$ Rounds -2.5 up to nearest multiple of $-2(-4)$
-2)
$=$ CEILING(-2.5, 2) Returns an error, because -2.5 and 2 have different signs (\#NUM!)
$=$ CEILING(1.5, Rounds 1.5 up to the nearest multiple of 0.1 (1.5) 0.1)
$=$ CEILING(0.234, Rounds 0.234 up to the nearest multiple of 0.01 0.01) (0.24)

## COS

Returns the cosine of the given angle.
Syntax
COS(number)
Number is the angle in radians for which you want the cosine.

## Remark

If the angle is in degrees, multiply it by PI()$/ 180$ or use the RADIANS function to convert it to radians.

## Example

| Formula | Description (Result) |
| :--- | :--- |
| $=\operatorname{COS}(1.047)$ | Cosine of 1.047 radians $(0.500171)$ |
| $=\operatorname{COS}(60 * \mathrm{PI}() / 180)$ | Cosine of 60 degrees $(0.5)$ |
| $=\operatorname{COS}($ RADIANS $(60))$ | Cosine of 60 degrees $(0.5)$ |

## COSH

Returns the hyperbolic cosine of a number.
Syntax
COSH(number)
Number is any real number for which you want to find the hyperbolic cosine.

## Remark

The formula for the hyperbolic cosine is:
$\operatorname{CosH}(z)=\frac{\mathrm{e}^{z}+\mathrm{e}^{-z}}{2}$

## Example

## Formula Description (Result)

$=\mathrm{COSH}(4) \quad$ Hyperbolic cosine of 4 (27.30823)

## DEGREES

Converts radians into degrees.

## Syntax

DEGREES(angle)
Angle is the angle in radians that you want to convert.

## Example

Formula Description (Result)
=DEGREES(PI()) Degrees of pi radians (180)

## EVEN

Returns number rounded up to the nearest even integer. You can use this function for processing items that come in twos. For example, a packing crate accepts rows of one or two items. The crate is full when the number of items, rounded up to the nearest two, matches the crate's capacity.

## Syntax

## EVEN(number)

Number is the value to round.

## Remarks

If number is nonnumeric, EVEN returns the \#VALUE! error value.
Regardless of the sign of number, a value is rounded up when adjusted away from zero. If number is an even integer, no rounding occurs.

## Example

## Formula Description (Result)

$=\operatorname{EVEN}(1.5)$ Rounds 1.5 up to the nearest even integer (2)
=EVEN(3) Rounds 3 up to the nearest even integer (4)
=EVEN(2) Rounds 2 up to the nearest even integer (2)
$=E V E N(-1)$ Rounds -1 up to the nearest even integer ( -2 )

## EXP

Returns e raised to the power of number. The constant e equals 2.71828182845904 , the base of the natural logarithm.

## Syntax

## EXP(number)

Number is the exponent applied to the base e.

## Remarks

To calculate powers of other bases, use the exponentiation operator ( ${ }^{\wedge}$ ).
EXP is the inverse of LN, the natural logarithm of number.
Example
Formula Description (Result)
=EXP(1) Approximate value of e (2.718282)
$=\operatorname{EXP}(2)$ Base of the natural logarithm e raised to the power of 2 (7.389056)

## FACT

Returns the factorial of a number. The factorial of a number is equal to 1*2*3*...* number.

Syntax
FACT(number)
Number is the nonnegative number you want the factorial of. If number is not an integer, it is truncated.

## Example

Formula Description (Result)
$=$ FACT(5) Factorial of 5, or 1*2*3*4*5 (120)
$=$ FACT(1.9) Factorial of the integer of 1.9 (1)
$=$ FACT(0) Factorial of 0 (1)
=FACT(-1) Negative numbers cause an error value (\#NUM!)
$=F A C T(1) \quad$ Factorial of 1 (1)

## FLOOR

Rounds number down, toward zero, to the nearest multiple of significance.

## Syntax

## FLOOR(number,significance)

Number is the numeric value you want to round.
Significance is the multiple to which you want to round.

## Remarks

If either argument is nonnumeric, FLOOR returns the \#VALUE! error value.

If number and significance have different signs, FLOOR returns the \#NUM! error value.

Regardless of the sign of number, a value is rounded down when adjusted away from zero. If number is an exact multiple of significance, no rounding occurs.

## Example

Formula Description (Result)
$=$ FLOOR $(2.5,1) \quad$ Rounds 2.5 down to nearest multiple of 1 (2)
$=F \operatorname{LOOR}(-2.5,-2)$ Rounds -2.5 down to nearest multiple of $-2(-2)$
$=F L O O R(-2.5,2)$ Returns an error, because -2.5 and 2 have different signs (\#NUM!)
$=F \operatorname{LOOR}(1.5, \quad$ Rounds 1.5 down to the nearest multiple of 0.1 (1.5) 0.1)
$=$ FLOOR(0.234, Rounds 0.234 down to the nearest multiple of 0.01 0.01) (0.23)

## INT

Rounds a number down to the nearest integer.
Syntax
INT(number)
Number is the real number you want to round down to an integer.

## Example 1

Formula Description (Result)
=INT(8.9) Rounds 8.9 down (8)
$=$ INT(-8.9) Rounds -8.9 down (-9)

## Example 2

Col1 Formula Description (Result)
$19.5=[$ Col1 $]$ Returns the decimal part of a positive real number INT([Col1]) in Col1 (0.5)

## LN

Returns the natural logarithm of a number. Natural logarithms are based on the constant e (2.71828182845904).

Syntax
LN(number)
Number is the positive real number for which you want the natural logarithm.

## Remark

LN is the inverse of the EXP function.

## Example

| Formula | Description (Result) |
| :--- | :--- |
| $=\mathrm{LN}(86)$ | Natural logarithm of $86(4.454347)$ |
| $=\mathrm{LN}(2.7182818)$ | Natural logarithm of the value of the constant e (1) |
| $=\mathrm{LN}(\operatorname{EXP}(3))$ | Natural logarithm of e raised to the power of 3 (3) |

## LOG

Returns the logarithm of a number to the base you specify.

## Syntax

LOG(number,base)
Number is the positive real number for which you want the logarithm.
Base is the base of the logarithm. If base is omitted, it is assumed to be 10.

## Example

| Formula | Description (Result) |
| :--- | :--- |
| $=$ LOG $(10)$ | Logarithm of $10(1)$ |
| $=\operatorname{LOG}(8,2)$ | Logarithm of 8 with base $2(3)$ |
| $=$ LOG $(86,2.7182818)$ | Logarithm of 86 with base e $(4.454347)$ |

## LOG10

Returns the base-10 logarithm of a number.
Syntax
LOG10(number)
Number is the positive real number for which you want the base-10 logarithm.

Example
Formula Description (Result)
=LOG10(86) Base-10 logarithm of 86 (1.934498451)
=LOG10(10) Base-10 logarithm of 10 (1)
=LOG10(1E5) Base-10 logarithm of 1E5 (5)
$=$ LOG10(10^5) Base-10 logarithm of 10^5 (5)

## MOD

Returns the remainder after number is divided by divisor. The result has the same sign as divisor.

Syntax
MOD(number,divisor)
Number is the number for which you want to find the remainder.
Divisor is the number by which you want to divide number.

## Remarks

If divisor is 0, MOD returns the \#DIV/0! error value.
The MOD function can be expressed in terms of the INT function:
$\operatorname{MOD}(\mathrm{n}, \mathrm{d})=\mathrm{n}-\mathrm{d} * \operatorname{INT}(\mathrm{n} / \mathrm{d})$

## Example

## Formula Description (Result)

$=\mathrm{MOD}(3,2) \quad$ Remainder of 3/2. (1)
$=\mathrm{MOD}(-3,2)$ Remainder of $-3 / 2$. The sign is the same as divisor. (1)
$=\mathrm{MOD}(3,-2)$ Remainder of $3 /-2$. The sign is the same as divisor. (-1)
$=\mathrm{MOD}(-3,-2)$ Remainder of $-3 /-2$. The sign is the same as divisor. ( -1 )

## ODD

Returns number rounded up to the nearest odd integer.
Syntax
ODD(number)
Number is the value to round.

## Remarks

If number is nonnumeric, ODD returns the \#VALUE! error value.
Regardless of the sign of number, a value is rounded up when adjusted away from zero. If number is an odd integer, no rounding occurs.

## Example

Formula Description (Result)
$=$ ODD (1.5) Rounds 1.5 up to the nearest odd integer (3)
$=$ ODD(3) Rounds 3 up to the nearest odd integer (3)
=ODD(2) Rounds 2 up to the nearest odd integer (3)
$=O D D(-1)$ Rounds -1 up to the nearest odd integer ( -1 )
$=$ ODD (-2) Rounds -2 up to the nearest odd integer ( -3 )

## PI

Returns the number 3.14159265358979, the mathematical constant pi, accurate to 15 digits.

## Syntax

Pl()

## Example

Formula Description (Result)
$=\mathrm{PI}() \quad \mathrm{Pi}(3.14159265358979)$
$=\mathrm{PI}() / 2 \quad \mathrm{Pi} / 2$ (1.570796327)
$=\mathrm{PI}()^{\star}\left(3^{\wedge} 2\right)$ Area of a circle, with the radius (28.27433388)

## POWER

Returns the result of a number raised to a power.
Syntax
POWER(number,power)
Number is the base number. It can be any real number.
Power is the exponent to which the base number is raised.

## Remark

The " $\wedge$ " operator can be used instead of POWER to indicate to what power the base number is to be raised, such as in $5^{\wedge} 2$.

## Example

Formula Description (Result)
$=\operatorname{POWER}(5,2) \quad 5$ squared (25)
=POWER(98.6,3.2) 98.6 raised to the power of 3.2 (2401077)
$=\operatorname{POWER}(4,5 / 4) \quad 4$ raised to the power of 5/4 (5.656854)

## PRODUCT

Multiplies all the numbers given as arguments and returns the product.

## Syntax

PRODUCT(number1,number2,...)
Number1, number2, ... are 1 to 30 numbers that you want to multiply.

## Remarks

Arguments that are numbers, logical values, or text representations of numbers are counted; arguments that are error values or text that cannot be translated into numbers cause errors.

If an argument is a column reference, only numbers are counted. Empty arguments, logical values, text, or error values are ignored.

## Example

| Col1 Col2 Col3 Formula | Description (Result) |  |  |  |
| :---: | :---: | :---: | :--- | :--- |
| 5 | 15 | 30 | =PRODUCT([Col1], [Col2], <br> [Col3]) | Multiplies the numbers <br> $(2250)$ |
| 5 | 15 | 30 | =PRODUCT([Col1], [Col2], <br> [Col3],2) | Multiplies the numbers and <br> $2(4500)$ |

## RADIANS

Converts degrees to radians.

## Syntax

RADIANS(angle)
Angle is an angle in degrees that you want to convert.

## Example

## Formula Description (Result)

=RADIANS(270) 270 degrees as radians (4.712389 or $3 \pi / 2$ radians)

## ROMAN

Converts an arabic numeral to roman, as text.

## Syntax

ROMAN(number,form)
Number is the arabic numeral you want converted.
Form is a number specifying the type of roman numeral you want. The roman numeral style ranges from Classic to Simplified, becoming more concise as the value of form increases. See the example following ROMAN $(499,0)$ below.

| Form | Type |
| :--- | :--- |
| 0 or omitted | Classic. |
| 1 | More concise. See example below. |
| 2 | More concise. See example below. |
| 3 | More concise. See example below. |
| 4 | Simplified. |
| TRUE | Classic. |
| FALSE | Simplified. |

## Remarks

If number is negative, the \#VALUE! error value is returned.
If number is greater than 3999, the \#VALUE! error value is returned.

## Example

| Formula | Description (Result) |
| :--- | :--- |
| =ROMAN(499,0) | Classic roman numeral style for 499 (CDXCIX) |
| =ROMAN(499,1) | More concise version for 499 (LDVLIV) |
| =ROMAN(499,2) | More concise version for 499 (XDIX) |
| =ROMAN(499,3) | More concise version for 499 (VDIV) |
| =ROMAN(499,4) | More concise version for 499 (ID) |
| =ROMAN(2013,0) | Classic roman numeral style for 2013 (MMXIII) |

## ROUND

Some of the content in this topic may not be applicable to some languages.

Rounds a number to a specified number of digits.

## Syntax

ROUND(number,num_digits)
Number is the number you want to round.
Num_digits specifies the number of digits to which you want to round the number.

## Remarks

If num_digits is greater than 0 (zero), then number is rounded to the specified number of decimal places.

If num_digits is 0 , then number is rounded to the nearest integer.
If num_digits is less than 0 , then number is rounded to the left of the decimal point.

## Example

## Formula Description (Result)

$=$ ROUND (2.15, Rounds 2.15 to one decimal place (2.2)
1)
$=$ ROUND(2.149, Rounds 2.149 to one decimal place (2.1)
1)
=ROUND(-1.475, Rounds -1.475 to two decimal places (-1.48)
2)
$=$ ROUND(21.5, Rounds 21.5 to one decimal place to the left of the -1) decimal point (20)

## ROUNDDOWN

Rounds a number down, toward zero.

## Syntax

ROUNDDOWN(number,num_digits)
Number is any real number that you want rounded down.
Num_digits is the number of digits to which you want to round the number.

## Remarks

ROUNDDOWN behaves like ROUND, except that it always rounds a number down.

If num_digits is greater than 0 (zero), then number is rounded down to the specified number of decimal places.

If num_digits is 0 , then number is rounded down to the nearest integer.
If num_digits is less than 0 , then number is rounded down to the left of the decimal point.

## Example

## Formula <br> =ROUNDDOWN(3.2, 0) <br> Description (Result) <br> Rounds 3.2 down to zero decimal places

 (3)=ROUNDDOWN $(76.9,0)$
Rounds 76.9 down to zero decimal places (76)
=ROUNDDOWN(3.14159, 3) Rounds 3.14159 down to three decimal places (3.141)
$=$ ROUNDDOWN(-3.14159, 1) Rounds -3.14159 down to one decimal place (-3.1)
=ROUNDDOWN(31415.92654, Rounds 31415.92654 down to 2 decimal
-2) places to the left of the decimal (31400)

## ROUNDUP

Rounds a number up, away from 0 (zero).
Syntax
ROUNDUP(number,num_digits)
Number is any real number that you want rounded up.
Num_digits is the number of digits to which you want to round the number.

## Remarks

ROUNDUP behaves like ROUND, except that it always rounds a number up.

If num_digits is greater than 0 (zero), then number is rounded up to the specified number of decimal places.

If num_digits is 0 , then number is rounded up to the nearest integer.
If num_digits is less than 0 , then number is rounded up to the left of the decimal point.

## Example

| Formula | Description (Result) |
| :--- | :--- |
| =ROUNDUP(3.2,0) | Rounds 3.2 up to zero decimal places (4) |
| =ROUNDUP(76.9,0) | Rounds 76.9 up to zero decimal places <br> (77) |
| =ROUNDUP(3.14159,3) | Rounds 3.14159 up to three decimal <br> places (3.142) |
| =ROUNDUP(-3.14159,1) | Rounds -3.14159 up to one decimal place <br> $(-3.2)$ |

$=$ ROUNDUP $(31415.92654,-2)$ Rounds 31415.92654 up to 2 decimal places to the left of the decimal (31500)

## SIGN

Determines the sign of a number. Returns 1 if the number is positive, zero ( 0 ) if the number is 0 , and -1 if the number is negative.

## Syntax

SIGN(number)
Number is any real number.

## Example

Formula Description (Result)
$=\operatorname{SIGN}(10) \quad$ Sign of a positive number (1)
$=$ SIGN(4-4) Sign of zero (0)
$=$ SIGN(-0.00001) Sign of a negative number (-1)

## SIN

Returns the sine of the given angle.
Syntax
SIN(number)
Number is the angle in radians for which you want the sine.

## Remark

If your argument is in degrees, multiply it by PI()$/ 180$ or use the RADIANS function to convert it to radians.

## Example

| Formula | Description (Result) |
| :--- | :--- |
| $=\mathrm{SIN}(\mathrm{PI}())$ | Sine of pi radians (0, approximately) |
| $=\mathrm{SIN}(\mathrm{PI}() / 2)$ | Sine of pi/2 radians $(1)$ |
| $=\mathrm{SIN}(30 * \mathrm{PI}() / 180)$ | Sine of 30 degrees $(0.5)$ |
| $=\mathrm{SIN}(\operatorname{RADIANS}(30))$ | Sine of 30 degrees $(0.5)$ |

## SINH

Returns the hyperbolic sine of a number.

## Syntax

## SINH(number)

Number is any real number.

## Remark

The formula for the hyperbolic sine is:
$\operatorname{SINH}(z)=\frac{\mathrm{e}^{2}-\mathrm{e}^{-z}}{2}$

## Example 1

## Formula Description (Result)

$=$ SINH(1) Hyperbolic sine of 1 (1.175201194)
$=$ SINH $(-1)$ Hyperbolic sine of $-1(-1.175201194)$

## Example 2

You can use the hyperbolic sine function to approximate a cumulative probability distribution. Suppose a laboratory test value varies between 0 and 10 seconds. An empirical analysis of the collected history of experiments shows that the probability of obtaining a result, $x$, of less than $t$ seconds is approximated by the following equation:
$\mathrm{P}(\mathrm{x}<\mathrm{t})=2.868 * \operatorname{SINH}(0.0342 * \mathrm{t})$, where $0<\mathrm{t}<10$
To calculate the probability of obtaining a result of less than 1.03 seconds, substitute 1.03 for t .

## Formula Description (Result)

$=2.868 * \operatorname{SINH}(0.0342 * 1.03)$ Probability of obtaining a result of less than 1.03 seconds ( 0.101049063 )

You can expect this result to occur about 101 times for every 1000 experiments.

## SQRT

Returns a positive square root.
Syntax
SQRT(number)
Number is the number for which you want the square root.

## Remark

If number is negative, SQRT returns the \#NUM! error value.

## Example

Formula Description (Result)
$=$ SQRT(16) Square root of 16 (4)
$=$ SQRT(-16) Square root of 16. Because the number is negative, an error is returned (\#NUM!)
$=$ SQRT(ABS(-16)) Square root of the absolute value of the number (4)

## SUM

Adds all the numbers in the specified arguments.
Syntax
SUM(number1,number2,...)
Number1, number2, ... are 1 to 30 arguments for which you want the total value or sum.

## Remarks

Numbers, logical values, and text representations of numbers that you type directly into the list of arguments are counted. See the first and second examples following.

Arguments cause errors if they are error values or text that cannot be translated into numbers.

## Example



## SUMSQ

Returns the sum of the squares of the arguments.

## Syntax

SUMSQ(number1,number2,...)
Number1, number2, ... are 1 to 30 arguments for which you want the sum of the squares.

## Example

Formula Description (Result)
$=$ SUMSQ $(3,4)$ Sum of the squares of 3 and 4 (25)

## TAN

Returns the tangent of the given angle.
Syntax
TAN(number)
Number is the angle in radians for which you want the tangent.

## Remark

If your argument is in degrees, multiply it by PI()$/ 180$ or use the RADIANS function to convert it to radians.

Example

| Formula | Description (Result) |
| :--- | :--- |
| $=\operatorname{TAN}(0.785)$ | Tangent of 0.785 radians $(0.99920)$ |
| $=\operatorname{TAN}(45 * \mathrm{PI}() / 180)$ | Tangent of 45 degrees (1) |
| =TAN(RADIANS(45)) | Tangent of 45 degrees (1) |

## TANH

Returns the hyperbolic tangent of a number.

## Syntax

TANH(number)
Number is any real number.

## Remark

The formula for the hyperbolic tangent is:
$\operatorname{TANH}(z)=\frac{\operatorname{SINH}(z)}{\operatorname{COSH}(z)}$

## Example

## Formula Description (Result)

$=$ TANH $(-2)$ Hyperbolic tangent of $-2(-0.96403)$
$=$ TANH(0) Hyperbolic tangent of $0(0)$
$=$ TANH $(0.5)$ Hyperbolic tangent of 0.5 (0.462117)

## TRUNC

Truncates a number to an integer by removing the fractional part of the number.

## Syntax

TRUNC(number,num_digits)
Number is the number you want to truncate.
Num_digits is a number specifying the precision of the truncation. The default value for num_digits is 0 (zero).

## Remark

TRUNC and INT are similar in that both return integers. TRUNC removes the fractional part of the number. INT rounds numbers down to the nearest integer based on the value of the fractional part of the number. INT and TRUNC are different only when using negative numbers: TRUNC(-4.3) returns -4 , but $\operatorname{INT}(-4.3)$ returns -5 because -5 is the lower number.

## Example

Formula Description (Result)
$=$ TRUNC(8.9) Integer part of 8.9 (8)
$=T R U N C(-8.9)$ Integer part of -8.9 (-8)
$=T R U N C(P I())$ Integer part of pi (3)

## AVEDEV

Returns the average of the absolute deviations of data points from their mean. AVEDEV is a measure of the variability in a data set.

## Syntax

AVEDEV(number1,number2, ...)
Number1, number2, ... are 1 to 30 arguments for which you want the average of the absolute deviations.

## Remarks

The arguments must be either numbers or column references that contain numbers.

If a column reference argument contains text, logical values, or is empty, those values are either ignored or return the \#VALUE! error value; however, the value zero is included.

The equation for average deviation is:
$\frac{1}{n} \sum|x-\bar{x}|$
AVEDEV is influenced by the unit of measurement in the input data.

## Example

| Col1 | Col2 | Col3 | Col4 | Col5 | Col6 | Col7 | Formula | Description (Result) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 4 | 5 | 6 | 7 | 5 | 4 | 3 | $\begin{aligned} & =\text { =AVEDEV([Col1], } \\ & \text { [Col2],[Col3], } \\ & \text { [Col4],[Col5], } \\ & \text { [Col6],[Col7]) } \end{aligned}$ | Average of the absolute deviations of the numbers from their mean (1.020408) |

## AVERAGE

Returns the average (arithmetic mean) of the arguments.

## Syntax

AVERAGE(number1,number2, ...)
Number1, number2, ... are 1 to 30 numeric arguments for which you want the average.

## Remarks

The arguments must be either numbers or references that contain numbers.

If an array or column reference argument contains text, logical values, or is empty, those values are either ignored or return the \#VALUE! error value; however, arguments with the value zero are included.

## Example

| Col1 | Col2 Col3 Col4 | Col5 | Formula | Description <br> (Result) |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :--- |
| 10 | 7 | 9 | 27 | 2 | =AVERAGE([Col1], <br> [Col2], [Col3], [Col4], | Average of the <br> column numbers <br> (11) |
| 10 | 7 | 9 | 27 | 2 | [Col5]) <br> =AVERAGE([Col1], <br> [Col2], [Col3], [Col4], <br> [Col5], 5) | Average of the <br> column numbers <br> and 5 (10) |

## AVERAGEA

Calculates the average (arithmetic mean) of the values in the list of arguments. Unlike the AVERAGE functions, text and logical values such as TRUE and FALSE are included in the calculation.

## Syntax

AVERAGEA(value1,value2, ...)
Value1, value2,... are 1 to 30 arguments for which you want the average.

## Remarks

Arguments that contain text evaluate as 0 (zero). Empty text ("") evaluates as 0 (zero). If the calculation must not include text values in the average, use the AVERAGE function.

Arguments that contain TRUE evaluate as 1; arguments that contain FALSE evaluate as 0 (zero).

## Example

| Col1 | Col2 | Col3 | Col4 | Col5 | Col6 | Formula | Description (Result) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 10 | 7 | 9 | 2 | 0 |  | =AVERAGEA([Col1], [Col2],[Col3],[Col4], [Col5]) | Average of the numbers (5.6) |
| 10 | 10 | 9 | 2 | 1 |  | =AVERAGEA([Col1], [Col2],[Col3],[Col4], [Col6]) | Average of the numbers, and the empty argument (7.75) |

## BETADIST

Returns the cumulative beta probability distribution function. The cumulative beta probability distribution function is commonly used to study variation in the percentage of something across samples, such as the fraction of the day people spend watching television.

## Syntax

BETADIST(x,alpha,beta,A,B)
$X \quad$ is the value between $A$ and $B$ at which to evaluate the function.
Alpha is a parameter to the distribution.
Beta is a parameter to the distribution.
A is an optional lower bound to the interval of $x$.
$B$ is an optional upper bound to the interval of $x$.

## Remarks

If any argument is nonnumeric, BETADIST returns the \#VALUE! error value.

If alpha $\leq 0$ or beta $\leq 0$, BETADIST returns the \#NUM! error value.
If $x<A, x>B$, or $A=B, B E T A D I S T$ returns the \#NUM! error value.
If you omit values for $A$ and $B$, BETADIST uses the standard cumulative beta distribution, so that $A=0$ and $B=1$.

## Example

## $X$ Alpha Beta A B Formula

## Description (Result)

281013 =BETADIST([X], Cumulative beta probability density
[Alpha],[Beta], function, for the parameters [A],[B]) (0.685470581)

## BETAINV

Returns the inverse of the cumulative beta probability distribution function. That is, if probability = BETADIST( $x, \ldots$ ), then
BETAINV(probability,...) = x. The cumulative beta distribution can be used in project planning to model probable completion times given an expected completion time and variability.

## Syntax

BETAINV(probability,alpha,beta,A,B)
Probability is a probability associated with the beta distribution.
Alpha is a parameter to the distribution.
Beta is a parameter to the distribution.
A is an optional lower bound to the interval of $x$.
$B$ is an optional upper bound to the interval of $x$.

## Remarks

If any argument is nonnumeric, BETAINV returns the \#VALUE! error value.

If alpha $\leq 0$ or beta $\leq 0$, BETAINV returns the \#NUM! error value.
If probability $\leq 0$ or probability $>1$, BETAINV returns the \#NUM! error value.

If you omit values for $A$ and $B, B E T A I N V$ uses the standard cumulative beta distribution, so that $A=0$ and $B=1$.

BETAINV uses an iterative technique for calculating the function. Given a probability value, BETAINV iterates until the result is accurate to within $\pm 3 \times 10-7$. If BETAINV does not converge after 100 iterations, the function returns the \#N/A error value.

## Example



# [Alpha],[Beta],[A],[B]) cumulative beta probability density function for the parameters (2) 

## BINOMDIST

Returns the individual term binomial distribution probability. Use BINOMDIST in problems with a fixed number of tests or trials, when the outcomes of any trial are only success or failure, when trials are independent, and when the probability of success is constant throughout the experiment. For example, BINOMDIST can calculate the probability that two of the next three babies born are male.

## Syntax

## BINOMDIST(number_s,trials,probability_s,cumulative)

Number_s is the number of successes in trials.
Trials is the number of independent trials.
Probability_s is the probability of success on each trial.
Cumulative is a logical value that determines the form of the function. If cumulative is TRUE, then BINOMDIST returns the cumulative distribution function, which is the probability that there are at most number_s
successes; if FALSE, it returns the probability mass function, which is the probability that there are exactly number_s successes.

## Remarks

Number_s and trials are truncated to integers.
If number_s, trials, or probability_s is nonnumeric, BINOMDIST returns the \#VALUE! error value.

If number_s < 0 or number_s > trials, BINOMDIST returns the \#NUM! error value.

If probability_s < 0 or probability_s > 1, BINOMDIST returns the \#NUM! error value.

The binomial probability mass function is:
$b(x ; n, p)=\binom{n}{x} p^{n}(1-p)^{n-s}$
where:
$\binom{n}{x}$
is COMBIN( $n, x)$.
Note The COMBIN function is used here to illustrate the mathematical formula used by the BINOMDIST function. It is not a function that you can use in a list.

The cumulative binomial distribution is:
$B(x ; n, p)=\sum_{y=0}^{x} b(y, n, p)$

## Example

| number_s trials probability_s | Formula | Description <br> (Result) |  |
| :--- | :--- | :--- | :--- |
| 6 | $10 \quad 0.5$ | =BINOMDIST([number_s], | Probability of |
|  |  | [trials], | exactly 6 of |
|  |  | [probability_s],FALSE) | 10 trials |
|  |  | being |  |
|  |  | successful |  |
|  |  | $(0.205078)$ |  |
|  |  |  |  |

## CHIDIST

Returns the one-tailed probability of the chi-squared distribution. The y2 distribution is associated with a y2 test. Use the y2 test to compare observed and expected values. For example, a genetic experiment might hypothesize that the next generation of plants will exhibit a certain set of colors. By comparing the observed results with the expected ones, you can decide whether your original hypothesis is valid.

## Syntax

## CHIDIST(x,degrees_freedom)

$X$ is the value at which you want to evaluate the distribution.
Degrees_freedom is the number of degrees of freedom.

## Remarks

If either argument is nonnumeric, CHIDIST returns the \#VALUE! error value.

If $x$ is negative, CHIDIST returns the \#NUM! error value.
If degrees_freedom is not an integer, it is truncated.
If degrees_freedom $<1$ or degrees_freedom $\geq 10^{\wedge} 10$, CHIDIST returns the \#NUM! error value.

CHIDIST is calculated as CHIDIST $=P(X>x)$, where $X$ is a $y 2$ random variable.

## Example

| X | DegreesFreedom | Formula | Description (Result) |
| :---: | :---: | :---: | :---: |
| 18.307 | 10 | =CHIDIST([X], <br> [DegreesFreedom]) | One-tailed probability of the chi-squared distribution, for the specified arguments (0.050001) |

## CHIINV

Returns the inverse of the one-tailed probability of the chi-squared distribution. If probability = CHIDIST (x,...), then CHIINV(probability,...) = $x$. Use this function to compare observed results with expected ones to decide whether your original hypothesis is valid.

## Syntax

## CHIINV(probability,degrees_freedom)

Probability is a probability associated with the chi-squared distribution.
Degrees_freedom is the number of degrees of freedom.

## Remarks

If either argument is nonnumeric, CHIINV returns the \#VALUE! error value.

If probability < 0 or probability > 1, CHIINV returns the \#NUM! error value.
If degrees_freedom is not an integer, it is truncated.
If degrees_freedom $<1$ or degrees_freedom $\geq 10^{\wedge} 10$, CHIINV returns the \#NUM! error value.

CHIINV uses an iterative technique for calculating the function. Given a probability value, CHIINV iterates until the result is accurate to within $\pm$ $3 \times 10^{\wedge}-7$. If CHIINV does not converge after 100 iterations, the function returns the \#N/A error value.

## Example

| Probability DegreesFreedom Formula | Description <br> (Result) |  |
| :--- | :--- | :--- |
| 0.05 10 =CHIINV([Probability], |  |  |
|  | Inverse of the one- |  |
|  |  | [DegreesFreedom]) |
| tailed probability of |  |  |
|  | the chi-squared |  |

## CONFIDENCE

Returns the confidence interval for a population mean with a normal distribution. The confidence interval is a range on either side of a sample mean. For example, if you order a product through the mail, you can determine, with a particular level of confidence, the earliest and latest the product will arrive.

## Syntax

CONFIDENCE(alpha,standard_dev,size)
Alpha is the significance level used to compute the confidence level. The confidence level equals 100*(1-alpha)\%, or in other words, an alpha of 0.05 indicates a 95 percent confidence level.

Standard_dev is the population standard deviation for the data range and is assumed to be known.

Size is the sample size.

## Remarks

If any argument is nonnumeric, CONFIDENCE returns the \#VALUE! error value.

If alpha $\leq 0$ or alpha $\geq 1$, CONFIDENCE returns the \#NUM! error value.
If standard_dev $\leq 0$, CONFIDENCE returns the \#NUM! error value.
If size is not an integer, it is truncated.
If size $<1$, CONFIDENCE returns the \#NUM! error value.
If we assume alpha equals 0.05 , we need to calculate the area under the standard normal curve that equals ( 1 - alpha), or 95 percent. This value is $\pm 1.96$. The confidence interval is therefore:
$\bar{x} \pm 1.96\left(\frac{\sigma}{\sqrt{n}}\right)$

## Example

Suppose we observe that, in our sample of 50 commuters, the average length of travel to work is 30 minutes with a population standard deviation
of 2.5. We can be 95 percent confident that the population mean is in the interval:
$30 \pm 1.96\left(\frac{2.5}{\sqrt{50}}\right)$
Alpha StdDev Size Formula Description (Result) 0.05 . $50=$ CONFIDENCE([Alpha], Confidence interval for a [StdDev],[Size]) population mean. In other words, the average length
of travel to work equals 30
$\pm 0.692951$ minutes, or
29.3 to 30.7 minutes.
(0.692951)

## COUNT

Counts the number of arguments that contain numbers.

## Syntax

COUNT(value1,value2, ...)
Value1, value2, ... are 1 to 30 arguments that can contain or refer to a variety of different types of data, but only numbers are counted.

## Remarks

Arguments that are numbers, dates, or text representations of numbers are counted; arguments that are error values or text that cannot be translated into numbers are ignored.

If you need to count logical values, text, or error values, use the COUNTA function.

## Example

| Col1 Col2 | Col3 Col4 | Col5 | Col6 | Col7 | Formula | Descrip (Result |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Sales 12/8/2008 | 19 | 22.24 | TRU |  | =COUN [Col2],[C [Col4],[C [Col6],[C | Counts number argume that con number the list |
|  | 19 |  | TRU | \#DIVI | $\begin{aligned} & =\text { COUNT } \\ & \text { [Col5],[Cc } \\ & \text { [Col7]) } \end{aligned}$ | Counts number argume that con number the last rows of list (2) |
| Sales 2/8/2008 | 19 | 22.24 | TRUE | \#DIV/0 |  | Counts number argume |

[Col6],[Col7],2) that con number the list, the valu (4)

## COUNTA

Counts the number of arguments that are not empty.

## Syntax

COUNTA(value1,value2, ...)
Value1, value2, ... are 1 to 30 arguments representing the values you want to count. In this case, a value is any type of information, including empty text ('"') but not including empty arguments. If you do not need to count logical values, text, or error values, use the COUNT function.

## Example



Sales 12/8/2008 19 22.24 TRUE \#DIV/O! =COUNTA([Col1], Counts [Col2],[Col3], numbe [Col4],[Col5], nonbla [Col6],[Col7],2) argum in the I and th value:
Sales 12/8/2008 19 22.24 TRUE \#DIV/O! =COUNTA([Col1], Counts [Col2],[Col3], numbe [Col4],[Col5], nonbla [Col6],[Col7], argum

## "Two")

in the I and th value '
(7)

## CRITBINOM

Returns the smallest value for which the cumulative binomial distribution is greater than or equal to a criterion value. Use this function for quality assurance applications. For example, use CRITBINOM to determine the greatest number of defective parts that are allowed to come off an assembly line run without rejecting the entire lot.

## Syntax

CRITBINOM(trials,probability_s,alpha)
Trials is the number of Bernoulli trials.
Probability_s is the probability of a success on each trial.
Alpha is the criterion value.

## Remarks

If any argument is nonnumeric, CRITBINOM returns the \#VALUE! error value.

If trials is not an integer, it is truncated.
If trials $<0$, CRITBINOM returns the \#NUM! error value.
If probability_s is $<0$ or probability_s $>1$, CRITBINOM returns the \#NUM! error value.

If alpha $<0$ or alpha $>1$, CRITBINOM returns the $\# N U M!$ error value.

## Example

## Trials Probability_s Alpha Formula Description (Result)

 $60.5 \quad 0.75 \begin{array}{ll}\text { =CRITBINOM([Trials], } \\ & \text { [Probability_s], } \\ \text { [Alpha]) }\end{array} \quad \begin{aligned} & \text { Smallest value for } \\ & \text { which the cumulative } \\ & \text { binomial distribution is } \\ & \text { greater than or equal } \\ & \text { to a criterion value (4) }\end{aligned}$
## DEVSQ

Returns the sum of squares of deviations of data points from their sample mean.

## Syntax

DEVSQ(number1,number2, ...)
Number1,number2, ... are 1 to 30 arguments for which you want to calculate the sum of squared deviations.

## Remarks

The arguments must be numbers or column references that contain numbers.

If argument contains text, logical values, or is empty, those values are ignored; however, arguments with the value zero are included.

The equation for the sum of squared deviations is:
DEVSQ $=\sum(x-\bar{x})^{2}$

## Example

| Col1 | Col2 | Col3 | Col4 | Col5 | Col6 | Col7 | Formula | Description (Result) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 4 | 5 | 8 | 7 | 11 | 4 | 3 | $\begin{aligned} & \text { =DEVSQ([Col1], } \\ & \text { [Col2],[Col3], } \\ & \text { [Col4],[Col5], } \\ & \text { [Col6],[Col7]) } \end{aligned}$ | Sum of squares of deviations of data from their sample mean (48) |

## EXPONDIST

Returns the exponential distribution. Use EXPONDIST to model the time between events, such as how long an automated bank teller takes to deliver cash. For example, you can use EXPONDIST to determine the probability that the process takes at most 1 minute.

## Syntax

## EXPONDIST(x,lambda,cumulative)

$X$ is the value of the function.
Lambda is the parameter value.
Cumulative is a logical value that indicates which form of the exponential function to provide. If cumulative is TRUE, EXPONDIST returns the cumulative distribution function; if FALSE, it returns the probability density function.

## Remarks

If $x$ or lambda is nonnumeric, EXPONDIST returns the \#VALUE! error value.

If $x<0$, EXPONDIST returns the \#NUM! error value.
If lambda $\leq 0$, EXPONDIST returns the \#NUM! error value.
The equation for the probability density function is:
$f(x ; \lambda)=\lambda e^{-\lambda x}$
The equation for the cumulative distribution function is:
$F(x ; \lambda)=1-e^{-\lambda x}$

## Example 1

## Formula Description (Result) =EXPONDIST(0.2,10,FALSE) Probability exponential distribution function (1.353353)

## Example 2

| X Lambda Formula | Description (Result) |  |
| :--- | :--- | :--- |
| 0.210 | =EXPONDIST([X,] | Cumulative exponential distribution |
|  | [Lambda],TRUE) | function $(0.864665)$ |

## FDIST

Returns the F probability distribution. You can use this function to determine whether two data sets have different degrees of diversity. For example, you can examine test scores given to men and women entering high school and determine if the variability in the females is different from that found in the males.

## Syntax

FDIST(x,degrees_freedom1,degrees_freedom2)
$X$ is the value at which to evaluate the function.
Degrees_freedom1 is the numerator degrees of freedom.
Degrees_freedom2 is the denominator degrees of freedom.

## Remarks

If any argument is nonnumeric, FDIST returns the \#VALUE! error value.
If $x$ is negative, FDIST returns the \#NUM! error value.
If degrees_freedom1 or degrees_freedom2 is not an integer, it is truncated.

If degrees_freedom1 < 1 or degrees_freedom $1 \geq 10^{\wedge} 10$, FDIST returns the \#NUM! error value.

If degrees_freedom $2<1$ or degrees_freedom $2 \geq 10^{\wedge} 10$, FDIST returns the \#NUM! error value.

FDIST is calculated as FDIST= $P(F<x)$, where $F$ is a random variable that has an $F$ distribution.

## Example

| X | Degrees1 Degrees2 | Formula | Description (Result) |
| :--- | :---: | :--- | :--- |
| 15.206756 | 4 | =FDIST $([X]$, | F probability distribution |
|  |  | [Degrees1], <br> [Der the specified |  |
|  |  | [Degrees2]) | arguments (0.01) |

## FINV

Returns the inverse of the $F$ probability distribution. If $p=\operatorname{FDIST}(x, \ldots)$, then $\operatorname{FINV}(p, \ldots)=x$.

The F distribution can be used in an F-test that compares the degree of variability in two data sets. For example, you can analyze income distributions in the United States and Canada to determine whether the two countries have a similar degree of diversity.

## Syntax

FINV(probability,degrees_freedom1,degrees_freedom2)
Probability is a probability associated with the F cumulative distribution.
Degrees_freedom1 is the numerator degrees of freedom.
Degrees_freedom2 is the denominator degrees of freedom.

## Remarks

If any argument is nonnumeric, FINV returns the \#VALUE! error value.
If probability < 0 or probability > 1, FINV returns the \#NUM! error value.
If degrees_freedom1 or degrees_freedom2 is not an integer, it is truncated.

If degrees_freedom1 < 1 or degrees_freedom1 $\geq 10^{\wedge} 10$, FINV returns the \#NUM! error value.

If degrees_freedom $2<1$ or degrees_freedom $2 \geq 10^{\wedge} 10$, FINV returns the \#NUM! error value.

FINV can be used to return critical values from the F distribution. For example, the output of an ANOVA calculation often includes data for the $F$ statistic, $F$ probability, and $F$ critical value at the 0.05 significance level. To return the critical value of $F$, use the significance level as the probability argument to FINV.

FINV uses an iterative technique for calculating the function. Given a probability value, FINV iterates until the result is accurate to within $\pm$ $3 \times 10^{\wedge}-7$. If FINV does not converge after 100 iterations, the function returns the \#N/A error value.

## Example

| Probability | Degrees1 | Degrees2 | Formula | Description (Result) |
| :---: | :---: | :---: | :---: | :---: |
| 0.01 | 6 | 4 | $\begin{aligned} & =\text { FINV([Probability], } \\ & \text { [Degrees1], } \\ & \text { [Degrees2]) } \end{aligned}$ | Inverse of the F probability distribution for the specified arguments (15.20675) |

## FISHER

Returns the Fisher transformation at x. This transformation produces a function that is approximately normally distributed rather than skewed. Use this function to perform hypothesis testing on the correlation coefficient.

## Syntax

FISHER(x)
$X$ is a numeric value for which you want the transformation.

## Remarks

If $x$ is nonnumeric, FISHER returns the \#VALUE! error value.
If $x \leq-1$ or if $x \geq 1$, FISHER returns the \#NUM! error value.
The equation for the Fisher transformation is:
$z^{\prime}=\frac{1}{2} \ln \left(\frac{1+x}{1-x}\right)$

## Example

## Formula Description (Result)

=FISHER(0.75) Fisher transformation at 0.75 (0.972955)

## FISHERINV

Returns the inverse of the Fisher transformation. Use this transformation when analyzing correlations between ranges or arrays of data. If $y=$ $\operatorname{FISHER}(x)$, then $\operatorname{FISHERINV}(y)=x$.
Syntax
FISHERINV(y)
$Y$ is the value for which you want to perform the inverse of the transformation.

## Remarks

If y is nonnumeric, FISHERINV returns the \#VALUE! error value.
The equation for the inverse of the Fisher transformation is:
$x=\frac{e^{2 y}-1}{e^{2, y}+1}$

## Example

## Formula Description (Result)

$=$ FISHERINV(0.972955) Inverse of the Fisher transformation at 0.972955 (0.75)

## GAMMADIST

Returns the gamma distribution. You can use this function to study variables that may have a skewed distribution. The gamma distribution is commonly used in queuing analysis.

## Syntax

## GAMMADIST(x, alpha, beta,cumulative)

$X$ is the value at which you want to evaluate the distribution.
Alpha is a parameter to the distribution.
Beta is a parameter to the distribution. If beta $=1$, GAMMADIST returns the standard gamma distribution.

Cumulative is a logical value that determines the form of the function. If cumulative is TRUE, GAMMADIST returns the cumulative distribution function; if FALSE, it returns the probability mass function.

## Remarks

If $x$, alpha, or beta is nonnumeric, GAMMADIST returns the \#VALUE! error value.

If $x<0$, GAMMADIST returns the \#NUM! error value.
If alpha $\leq 0$ or if beta $\leq 0$, GAMMADIST returns the \#NUM! error value.
The equation for the gamma distribution is:
$f(x ; \alpha, \beta)=\frac{1}{\beta^{\alpha} \Gamma(\alpha)} x^{\alpha-1} e^{-\frac{y}{\theta}}$
The standard gamma distribution is:
$f(x ; \alpha)=\frac{x^{\alpha-1} e^{-x}}{\Gamma(\alpha x)}$
When alpha $=1$, GAMMADIST returns the exponential distribution with: $\lambda=\frac{1}{P}$

For a positive integer $n$, when alpha $=n / 2$, beta $=2$, and cumulative $=$ TRUE, GAMMADIST returns ( $1-$ CHIDIST $(x)$ ) with $n$ degrees of freedom.

When alpha is a positive integer, GAMMADIST is also known as the Erlang distribution.

## Example

| X | Alpha Beta Formula | Description (Result) |  |
| :--- | :---: | :--- | :--- |
| = 109 | 2 | =GAMMADIST([X], <br> [Alpha],[Beta],FALSE) | Probability gamma distribution of <br> the arguments $(0.032639)$ |
| 109 | 2 | =GAMMADIST([X], <br> [Alpha],[Beta],TRUE) | Cumulative gamma distribution of <br> the arguments $(0.068094)$ |

## GAMMAINV

Returns the inverse of the gamma cumulative distribution. If $p=$ GAMMADIST $(x, \ldots)$, then GAMMAINV $(p, \ldots)=x$.

You can use this function to study a variable whose distribution may be skewed.

## Syntax

## GAMMAINV(probability,alpha,beta)

Probability is the probability associated with the gamma distribution.
Alpha is a parameter to the distribution.
Beta is a parameter to the distribution. If beta $=1$, GAMMAINV returns the standard gamma distribution.

## Remarks

If any argument is nonnumeric, GAMMAINV returns the \#VALUE! error value.

If probability < 0 or probability > 1, GAMMAINV returns the \#NUM! error value.

If alpha $\leq 0$ or if beta $\leq 0$, GAMMAINV returns the \#NUM! error value.
GAMMAINV uses an iterative technique for calculating the function. Given a probability value, GAMMAINV iterates until the result is accurate to within $\pm 3 \times 10^{\wedge}-7$. If GAMMAINV does not converge after 100 iterations, the function returns the \#N/A error value.

## Example

| Probability Alpha Beta Formula | Description <br> (Result) |
| :--- | :--- | :--- | :--- |
| 0.068094 9 =GAMMAINV([Probability], <br> [Alpha],[Beta] $)$ Inverse of the <br> gamma cumulative <br> distribution for the  <br> arguments (10)   |  |

## GAMMALN

Returns the natural logarithm of the gamma function, $\Gamma(x)$.

## Syntax

GAMMALN(x)
$X$ is the value for which you want to calculate GAMMALN.

## Remarks

If $x$ is nonnumeric, GAMMALN returns the \#VALUE! error value.
If $x \leq 0, G A M M A L N$ returns the $\# N U M$ ! error value.
The number e raised to the GAMMALN(i) power, where i is an integer, returns the same result as (i-1)!.

GAMMALN is calculated as follows:

## GAMMALN $=\operatorname{LN}(\Gamma(x))$

where:
$\Gamma(x)=\int_{0}^{\infty} e^{-u} u^{x-1} d u$

## Example

Formula Description (Result) $=$ GAMMALN(4) Natural logarithm of the gamma function at 4 (1.791759)

## GEOMEAN

Returns the geometric mean of positive data. For example, you can use GEOMEAN to calculate average growth rate given compound interest with variable rates.

## Syntax

GEOMEAN(number1,number2, ...)
Number1,number2, ... are 1 to 30 arguments for which you want to calculate the mean.

## Remarks

The arguments must be either numbers or column references that contain numbers.

If a column reference argument contains text, logical values, or is empty, those values are ignored; however, arguments with the value zero are included.

If any data point $\leq 0$, GEOMEAN returns the $\# N U M$ ! error value.
The equation for the geometric mean is:

$$
G M_{\bar{y}}=\sqrt[n]{y_{1} y_{2} y_{3} \ldots y_{n}}
$$

## Example

| Col1 | Col2 | Col3 | Col4 | Col5 | Col6 | Col7 | Formula | Description (Result) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 4 | 5 | 8 | 7 | 11 | 4 | 3 | =GEOMEAN([Col1], [Col2],[Col3],[Col4], [Col5],[Col6],[Col7]) | Geometric mean of the data (5.476987) |

## HARMEAN

Returns the harmonic mean of a data set. The harmonic mean is the reciprocal of the arithmetic mean of reciprocals.

Syntax
HARMEAN(number1,number2, ...)
Number1,number2, ... are 1 to 30 arguments for which you want to calculate the mean.

## Remarks

The arguments must be either numbers or column references that contain numbers.

If a column reference argument contains text, logical values, or is empty, those values are ignored; however, arguments with the value zero are included.

If any data point $\leq 0$, HARMEAN returns the \#NUM! error value.
The harmonic mean is always less than the geometric mean, which is always less than the arithmetic mean.

The equation for the harmonic mean is:
$\frac{1}{H_{j^{k}}}=\frac{1}{n} \sum \frac{1}{Y_{j}}$

## Example

| Col1 | Col2 | Col3 | Col4 | Col5 | Col6 | Col7 | Formula | Description (Result) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 4 | 5 | 8 | 7 | 11 | 4 | 3 | =HARMEAN([Col1], [Col2],[Col3],[Col4], [Col5],[Col6],[Col7]) | Harmonic mean of the data (5.028376) |

## HYPGEOMDIST

Returns the hypergeometric distribution. HYPGEOMDIST returns the probability of a given number of sample successes, given the sample size, population successes, and population size. Use HYPGEOMDIST for problems with a finite population, where each observation is either a success or a failure, and where each subset of a given size is chosen with equal likelihood.

## Syntax

## HYPGEOMDIST(sample_s,number_sample,population_s,number_po|

Sample_s is the number of successes in the sample.
Number_sample is the size of the sample.
Population_s is the number of successes in the population.
Number_population is the population size.

## Remarks

All arguments are truncated to integers.
If any argument is nonnumeric, HYPGEOMDIST returns the \#VALUE! error value.

If sample_s < 0 or sample_s is greater than the lesser of number_sample or population_s, HYPGEOMDIST returns the \#NUM! error value.

If sample_s is less than the larger of 0 or (number_sample number_population + population_s), HYPGEOMDIST returns the \#NUM! error value.

If number_sample < 0 or number_sample > number_population, HYPGEOMDIST returns the \#NUM! error value.

If population_s < 0 or population_s > number_population, HYPGEOMDIST returns the \#NUM! error value.

If number_population < 0, HYPGEOMDIST returns the \#NUM! error value.

The equation for the hypergeometric distribution is:
$P(X=x)=h(x, n, M, N)=\frac{\binom{M}{x}\binom{N-M}{n-x}}{\binom{N}{n}}$
where:
x = sample_s
n = number_sample
M = population_s
$\mathrm{N}=$ number_population
HYPGEOMDIST is used in sampling without replacement from a finite population.

## Example

A sampler of chocolates contains 20 pieces. Eight pieces are caramels, and the remaining 12 are nuts. If a person selects 4 pieces at random, the following function returns the probability that exactly 1 piece is a caramel.

|  |  |  |  |
| :--- | :---: | :---: | :---: |
| Sample_s | Number_sample Population_s |  |  |
| Number_Population | Formul |  |  |
| 1 | 4 | 8 | 20 |
|  |  | =HYPG |  |
|  |  | [Numbe |  |
|  |  | [Popula |  |
|  |  | [Numbe |  |

## KURT

Returns the kurtosis of a data set. Kurtosis characterizes the relative peakedness or flatness of a distribution compared with the normal distribution. Positive kurtosis indicates a relatively peaked distribution. Negative kurtosis indicates a relatively flat distribution.

## Syntax

KURT(number1,number2, ...)
Number1,number2, ... are 1 to 30 arguments for which you want to calculate kurtosis.

## Remarks

The arguments must be either numbers or column references that contain numbers.

If a column reference argument contains text, logical values, or is empty, those values are ignored; however, arguments with the value zero are included.

If there are fewer than four data points, or if the standard deviation of the sample equals zero, KURT returns the \#DIV/0! error value.

Kurtosis is defined as:

$$
\begin{aligned}
\left\{\frac{n(n+1)}{(n-1)(n-2)(n-3)}\right. & \left.\sum\left(\frac{x_{j}-\bar{x}}{s}\right)^{4}\right\} \\
& -\frac{3(n-1)^{2}}{(n-2)(n-3)}
\end{aligned}
$$

where:
$s$ is the sample standard deviation.

## Example


[Col6],[Col7], [Col8],[Col9], [Col10])

## LOGINV

Returns the inverse of the lognormal cumulative distribution function of $x$, where $\ln (x)$ is normally distributed with parameters mean and standard_dev. If $p=\operatorname{LOGNORMDIST}(x, \ldots)$ then $\operatorname{LOGINV}(p, \ldots)=x$.
Use the lognormal distribution to analyze logarithmically transformed data.

## Syntax

## LOGINV(probability,mean,standard_dev)

Probability is a probability associated with the lognormal distribution.
Mean is the mean of $\ln (x)$.
Standard_dev is the standard deviation of $\ln (x)$.

## Remarks

If any argument is nonnumeric, LOGINV returns the \#VALUE! error value.
If probability < 0 or probability > 1, LOGINV returns the \#NUM! error value.

If standard_dev <= 0, LOGINV returns the \#NUM! error value.
The inverse of the lognormal distribution function is:


## Example

| Probablility Mean StdDev | Formula | Description <br> (Result) |
| :--- | :--- | :--- | :--- | :--- |
| 0.039084 3.5 1.2 =LOGINV([Probablility], <br>   Inverse of the  <br> [Mean], [StdDev]) lognormal cumulative <br> distribution function   <br>   for the specified  <br>     <br>   $(4.000028)$  |  |  |

## LOGNORMDIST

Returns the cumulative lognormal distribution of $x$, where $\ln (x)$ is normally distributed with the parameters mean and standard_dev. Use this function to analyze data that has been logarithmically transformed.

## Syntax

## LOGNORMDIST(x,mean,standard_dev)

$X$ is the value at which to evaluate the function.
Mean is the mean of $\ln (x)$.
Standard_dev is the standard deviation of $\ln (x)$.

## Remarks

If any argument is nonnumeric, LOGNORMDIST returns the \#VALUE! error value.

If $x \leq 0$ or if standard_dev $\leq 0$, LOGNORMDIST returns the \#NUM! error value.

The equation for the lognormal cumulative distribution function is:
$\operatorname{LOGNORMDIST}(x, \mu, \sigma)=\operatorname{NORMSDIST}\left(\frac{\ln (x)-\mu}{a}\right)$

## Example

| X Mean StdDev | Formula | Description (Result) |  |
| :--- | :--- | :--- | :--- |
| 4 3.5 1.2 | $=$ =LOGNORMDIST([X], Cumulative lognormal |  |  |
|  |  | $[$ Mean $],[$ StdDev $])$ | distribution at 4 with the specified <br> arguments $(0.039084)$ |

## MAX

Returns the largest value in a set of values.

## Syntax

MAX(number1,number2, ...)
Number1,number2, ... are 1 to 30 numbers for which you want to find the maximum value.

## Remarks

You can specify arguments that are numbers, empty arguments, logical values, or text representations of numbers. Arguments that are error values or text that cannot be translated into numbers cause errors.

If logical values and text must not be ignored, use MAXA instead.
If the arguments contain no numbers, MAX returns 0 (zero).

## Example

| Coll | Col2 | Col3 | col4 | Col5 | Formula | Description (Result) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 10 | 7 | 9 | 27 | 2 | $\begin{aligned} & =\mathrm{MAX}([C o l 1],[\mathrm{Col} 2], \\ & \text { [Col3],[Col4],[Col5]] } \end{aligned}$ | Largest of the numbers (27) |
| 10 | 7 | 9 | 27 | 2 | $\begin{aligned} & =\mathrm{MAX}(\mathrm{Col11],[Col2],} \\ & {[\text { Col3],[Col4],[Col5],30) }} \end{aligned}$ | Largest of the numbers and 30 (30) |

## MAXA

Returns the largest value in a list of arguments. Text and logical values such as TRUE and FALSE are compared as well as numbers.

MAXA is similar to MINA. For more information, see the examples for MINA.

## Syntax

MAXA(value1,value2, ...)
Value1, Value2, ... are 1 to 30 values for which you want to find the largest value.

## Remarks

You can specify arguments that are numbers, empty arguments, logical values, or text representations of numbers. Arguments that are error values cause errors. If the calculation must not include text or logical values, use MAX instead.

Arguments that contain TRUE evaluate as 1; arguments that contain text or FALSE evaluate as 0 (zero).

If the arguments contain no values, MAXA returns 0 (zero).

## Example

| Col | Co | Co | Col4 | col5 | Formula | Description (Result) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 0 | 0.2 | 0.5 | 0.4 |  | $\begin{aligned} & =\mathrm{MAXA}([\mathrm{Col} 1], \\ & {[\mathrm{Col} 2],[\mathrm{Col} 3],[\mathrm{Col} 4],} \\ & \text { [Col5] }) \end{aligned}$ | Largest of the numbers TRUE evaluates to 1 <br> (1) |

## MEDIAN

Returns the median of the given numbers. The median is the number in the middle of a set of numbers; that is, half the numbers have values that are greater than the median, and half have values that are less.

## Syntax

MEDIAN(number1,number2, ...)
Number1, number2, ... are 1 to 30 numbers for which you want the median.

## Remarks

The arguments should be either numbers or column references that contain numbers.

If a column reference argument contains text, logical values, or is empty, those values are ignored; however, arguments with the value zero are included.

If there is an even number of numbers in the set, then MEDIAN calculates the average of the two numbers in the middle. See the second formula following.

## Example

| Col1 | Col2 | Col3 | Col4 | Col5 | Col6 | Formula | Description (Result) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 | 6 | $\begin{aligned} & =\mathrm{MEDIAN}([\mathrm{Col} 1], \\ & \text { [Col2],[Col3], } \\ & \text { [Col4],[Col5]) } \end{aligned}$ | Median of the first 5 numbers in the list (3) |
| 1 | 2 | 3 | 4 | 5 | 6 | $\begin{aligned} & =\mathrm{MEDIAN}([\mathrm{Col1} 1], \\ & \text { [Col2],[Col3], } \\ & \text { [Col4],[Col5], } \\ & \text { [Col6]) } \end{aligned}$ | Median of all the numbers, or the average of 3 and 4 (3.5) |

## MIN

Returns the smallest number in a set of values.

## Syntax

MIN(number1,number2, ...)
Number1, number2, ... are 1 to 30 numbers for which you want to find the minimum value.

## Remarks

You can specify arguments that are numbers, empty, logical values, or text representations of numbers. Arguments that are error values or text that cannot be translated into numbers cause errors.

If an argument is a column reference, only numbers are used. If logical values and text should not be ignored, use MINA instead.

If the arguments contain no numbers, MIN returns 0 .

## Example

| Coll | Col2 | Col3 | Col4 | Col5 | Formula | Description (Result) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 10 | 7 | 9 | 27 | 2 | $\begin{aligned} & =\mathrm{MIN}([\mathrm{Col} 1],[\mathrm{Col} 2], \\ & \text { [Col3],[Col4],[Col5] }) \end{aligned}$ | Smallest of the numbers (2) |
| 10 | 7 | 9 | 27 | 2 | $\begin{aligned} & =\mathrm{MIN}([\mathrm{Col} 1],[\mathrm{Col} 2], \\ & [\mathrm{Col} 3],[\mathrm{Col} 4],[\mathrm{Col} 5], 0) \end{aligned}$ | Smallest of the numbers and 0 (0) |

## MINA

Returns the smallest value in the list of arguments. Text and logical values such as TRUE and FALSE are compared as well as numbers.

Syntax
MINA(value1,value2,...)
Value1, value2,... are 1 to 30 values for which you want to find the smallest value.

## Remarks

You can specify arguments that are numbers, empty, logical values, or text representations of numbers. Arguments that are error values cause errors. If the calculation must not include text or logical values, use the MIN function instead.

Arguments that contain TRUE evaluate as 1; arguments that contain text or FALSE evaluate as 0 (zero).

If the arguments contain no values, MINA returns 0.

## Example

| Col1 Col2 Col3 Col4 Col5 Formula |  | Description (Result) |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :--- |
| FALSE 0.2 | 0.5 | 0.4 | 0.8 | $=\mathrm{MINA}([\mathrm{Col} 1]$, | Smallest of the |
|  |  |  |  | $[\mathrm{Col2],[Col3]}$, | numbers. FALSE |
|  |  |  | $[$ Col4],[Col5]) | evaluates to $0(0)$ |  |

## MODE

Returns the most frequently occurring, or repetitive, value in the argument list. Like MEDIAN, MODE is a location measure.

## Syntax

MODE(number1,number2, ...)
Number1, number2, ... are 1 to 30 arguments for which you want to calculate the mode.

## Remarks

The arguments should be numbers or column references that contain numbers.

If a column reference argument contains text, logical values, or is empty, those values are ignored; however, arguments with the value zero are included.

If the data set contains no duplicate data points, MODE returns the \#N/A error value.

In a set of values, the mode is the most frequently occurring value; the median is the middle value; and the mean is the average value. No single measure of central tendency provides a complete picture of the data. Suppose data is clustered in three areas, half around a single low value, and half around two large values. Both AVERAGE and MEDIAN may return a value in the relatively empty middle, and MODE may return the dominant low value.

## Example

| Col1 | Col2 | Col3 | Col4 | Col5 | Col6 | Formula | Description (Result) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 5.6 | 4 | 4 | 3 | 2 | 4 | $\begin{aligned} & =\mathrm{MODE}([\mathrm{Col} 1], \\ & \text { [Col2], [Col3], } \\ & \text { [Col4], [Col5], } \\ & \text { [Col6]) } \end{aligned}$ | Mode, or most frequently occurring number (4) |

## NEGBINOMDIST

Returns the negative binomial distribution. NEGBINOMDIST returns the probability that there will be number_f failures before the number_s-th success, when the constant probability of a success is probability_s. This function is similar to the binomial distribution, except that the number of successes is fixed, and the number of trials is variable. Like the binomial, trials are assumed to be independent.

For example, you need to find 10 people with excellent reflexes, and you know the probability that a candidate has these qualifications is 0.3 . NEGBINOMDIST calculates the probability that you will interview a certain number of unqualified candidates before finding all 10 qualified candidates.

## Syntax

## NEGBINOMDIST(number_f,number_s,probability_s)

Number_f is the number of failures.
Number_s is the threshold number of successes.
Probability_s is the probability of a success.

## Remarks

Number_f and number_s should be $>=0$.
Number_f and number_s are truncated to integers.
If any argument is nonnumeric, NEGBINOMDIST returns the \#VALUE! error value.

If probability_s < 0 or if probability > 1, NEGBINOMDIST returns the \#NUM! error value.

The equation for the negative binomial distribution is:
$n b(x ; r, p)=\binom{x+r-1}{r-1} p^{\prime}(1-p)^{\prime \prime}$
where:
$x$ is number_f, $r$ is number_s, and $p$ is probability_s.

## Example

| Number_f | f Number_s | Probability_s | Formula | Des (Re: |
| :---: | :---: | :---: | :---: | :---: |
| 10 | 5 | 0.25 | =NEGBINOMDIST([Number_f] | Neg |
|  |  |  | [Number_s], [Probability_s]) | bino |
|  |  |  |  | distr |
|  |  |  |  | spe argi |
|  |  |  |  | (0.0 |

## NORMDIST

Returns the normal distribution for the specified mean and standard deviation. This function has a very wide range of applications in statistics, including hypothesis testing.

## Syntax

## NORMDIST(x,mean,standard_dev,cumulative)

$X$ is the value for which you want the distribution.
Mean is the arithmetic mean of the distribution.
Standard_dev is the standard deviation of the distribution.
Cumulative is a logical value that determines the form of the function. If cumulative is TRUE, NORMDIST returns the cumulative distribution function; if FALSE, it returns the probability mass function.

## Remarks

If mean or standard_dev is nonnumeric, NORMDIST returns the \#VALUE! error value.

If standard_dev $\leq 0$, NORMDIST returns the \#NUM! error value.
If mean $=0$, standard_dev $=1$, and cumulative $=$ TRUE, NORMDIST returns the standard normal distribution, NORMSDIST.

The equation for the normal density function (cumulative $=$ FALSE) is:
$f(x, \mu, \sigma)=\frac{1}{\sqrt{2 \pi} \sigma} e^{-\left(\frac{(x-\mu)^{2}}{2 \sigma^{2}}\right)}$
When cumulative $=$ TRUE, the formula is the integral from negative infinity to $x$ of the given formula.

## Example

| X Mean StdDev | Formula | Description (Result) |  |
| :--- | :--- | :--- | :--- |
| $4240 \quad 1.5$ | =NORMDIST([X], | Cumulative distribution function |  |
|  |  | [Mean], | for the specified arguments |
|  |  | $[$ StdDev],TRUE) | $(0.908789)$ |

$4240 \quad 1.5 \quad=$ NORMDIST ( $[\mathrm{X}]$, Probability mass function for the [Mean], specified arguments (0.10934005) [StdDev],FALSE)

## NORMINV

Returns the inverse of the normal cumulative distribution for the specified mean and standard deviation.

## Syntax

NORMINV(probability,mean,standard_dev)
Probability is a probability corresponding to the normal distribution.
Mean is the arithmetic mean of the distribution.
Standard_dev is the standard deviation of the distribution.

## Remarks

If any argument is nonnumeric, NORMINV returns the \#VALUE! error value.

If probability < 0 or if probability > 1, NORMINV returns the \#NUM! error value.

If standard_dev $\leq 0$, NORMINV returns the \#NUM! error value.
If mean $=0$ and standard_dev $=1$, NORMINV uses the standard normal distribution (see NORMSINV).

NORMINV uses an iterative technique for calculating the function. Given a probability value, NORMINV iterates until the result is accurate to within $\pm 3 \times 10^{\wedge}-7$. If NORMINV does not converge after 100 iterations, the function returns the \#N/A error value.

## Example

| Probability | Mean | StdDev | Formula | Description (Result) |
| :---: | :---: | :---: | :---: | :---: |
| 0.908789 | 40 | 1.5 | =NORMINV([Probability], <br> [Mean],[StdDev]) | Inverse of the normal cumulative distribution for the specified arguments (42) |

## NORMSDIST

Returns the standard normal cumulative distribution function. The distribution has a mean of 0 (zero) and a standard deviation of one. Use this function in place of a table of standard normal curve areas.

## Syntax

NORMSDIST(z)
$Z \quad$ is the value for which you want the distribution.

## Remarks

If $z$ is nonnumeric, NORMSDIST returns the \#VALUE! error value.
The equation for the standard normal density function is:
$f(z)=\frac{1}{\sqrt{2 \pi}} e^{-\frac{z^{2}}{2}}$

## Example

Formula Description (Result)
=NORMSDIST(1.333333) Normal cumulative distribution function at 1.333333 ( 0.908789 )

## NORMSINV

Returns the inverse of the standard normal cumulative distribution. The distribution has a mean of zero and a standard deviation of one.

## Syntax

NORMSINV(probability)
Probability is a probability corresponding to the normal distribution.

## Remarks

If probability is nonnumeric, NORMSINV returns the \#VALUE! error value.

If probability < 0 or if probability > 1, NORMSINV returns the \#NUM! error value.

NORMSINV uses an iterative technique for calculating the function. Given a probability value, NORMSINV iterates until the result is accurate to within $\pm 3 \times 10^{\wedge}-7$. If NORMSINV does not converge after 100 iterations, the function returns the \#N/A error value.

## Example

## Formula Description (Result)

=NORMSINV(0.908789) Inverse of the standard normal cumulative distribution, with a probability of 0.908789 (1.3333)

## POISSON

Returns the Poisson distribution. A common application of the Poisson distribution is predicting the number of events over a specific time, such as the number of cars arriving at a toll plaza in 1 minute.

## Syntax

## POISSON(x,mean,cumulative)

$X \quad$ is the number of events.
Mean is the expected numeric value.
Cumulative is a logical value that determines the form of the probability distribution returned. If cumulative is TRUE, POISSON returns the cumulative Poisson probability that the number of random events occurring will be between zero and $x$ inclusive; if FALSE, it returns the Poisson probability mass function that the number of events occurring will be exactly $x$.

## Remarks

If $x$ is not an integer, it is truncated.
If $x$ or mean is nonnumeric, POISSON returns the \#VALUE! error value.
If $x \leq 0$, POISSON returns the $\# N U M!$ error value.
If mean $\leq 0$, POISSON returns the \#NUM! error value.
POISSON is calculated as follows.
For cumulative = FALSE:
POISSON $=\frac{e^{-\lambda} \lambda^{x}}{x!}$
For cumulative $=$ TRUE:
CUMPOISSON $=\sum_{k=0}^{x} \frac{e^{-\lambda} \lambda^{*}}{k!}$

## Example

25 =POISSON([X], Cumulative Poisson probability with the [Mean],TRUE) specified arguments (0.124652)
$25=$ POISSON([X], Poisson probability mass function with the [Mean],FALSE) specified arguments (0.084224)

## SKEW

Returns the skewness of a distribution. Skewness characterizes the degree of asymmetry of a distribution around its mean. Positive skewness indicates a distribution with an asymmetric tail extending toward more positive values. Negative skewness indicates a distribution with an asymmetric tail extending toward more negative values.

## Syntax

SKEW(number1,number2, ...)
Number1,number2... are 1 to 30 arguments for which you want to calculate skewness.

## Remarks

The arguments must be either numbers or column references that contain numbers.

If a column reference argument contains text, logical values, or is empty , those values are ignored; however, arguments with the value zero are included.

If there are fewer than three data points, or the sample standard deviation is zero, SKEW returns the \#DIV/O! error value.

The equation for skewness is defined as:
$\frac{n}{(n-1)(n-2)} \sum\left(\frac{x_{j}-\bar{x}}{s}\right)^{3}$

## Example



## STANDARDIZE

Returns a normalized value from a distribution characterized by mean and standard_dev.

## Syntax

STANDARDIZE(x,mean,standard_dev)
$X$ is the value you want to normalize.
Mean is the arithmetic mean of the distribution.
Standard_dev is the standard deviation of the distribution.

## Remarks

If standard_dev $\leq 0$, STANDARDIZE returns the \#NUM! error value.
The equation for the normalized value is:
$Z=\frac{X-, z}{\sigma}$

## Example

## X Mean StdDev Formula Description (Result)

$4240 \quad 1.5 \quad=$ STANDARDIZE ([X], Normalized value of 42 for the [Mean],[StdDev]) specified arguments (1.333333)

## STDEV

Estimates standard deviation based on a sample. The standard deviation is a measure of how widely values are dispersed from the average value (the mean).

## Syntax

STDEV(number1,number2,...)
Number1,number2,... are 1 to 30 number arguments corresponding to a sample of a population.

## Remarks

Logical values such as TRUE and FALSE and text are ignored. If logical values and text must not be ignored, use the STDEVA function.

STDEV assumes that its arguments are a sample of the population. If your data represents the entire population, then compute the standard deviation using STDEVP.

The standard deviation is calculated using the "nonbiased" or "n-1" method.

STDEV uses the following formula:
$\sqrt{\frac{\sum(x-\bar{x})^{2}}{(n-1)}}$

## Example

Suppose 10 tools stamped from the same machine during a production run are collected as a random sample and measured for breaking strength.

| St1 | St2 | St3 | St4 | St5 | St6 | St7 | St8 | St9 | St10 |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 1301 | 1368 | 1322 | 1310 |  |  |  |  |  |  |  |
| [St2], [St3], de <br> $[\mathrm{St4]},[\mathrm{St5]}$, brt <br> $[\mathrm{St}]$ ] $[\mathrm{St7}]$ str <br> $[\mathrm{St} 8],[\mathrm{St9}]$, $(2$ |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |

[St10])

## STDEVA

Estimates standard deviation based on a sample. The standard deviation is a measure of how widely values are dispersed from the average value (the mean). Text and logical values such as TRUE and FALSE are included in the calculation.

## Syntax

STDEVA(value1,value2, ...)
Value1,value2, ... are 1 to 30 values corresponding to a sample of a population.

## Remarks

STDEVA assumes that its arguments are a sample of the population. If your data represents the entire population, you must compute the standard deviation using STDEVPA.

Arguments that contain TRUE evaluate as 1; arguments that contain text or FALSE evaluate as 0 (zero). If the calculation must not include text or logical values, use the STDEV spreadsheet function instead.

The standard deviation is calculated using the "nonbiased" or "n-1" method.

STDEVA uses the following formula:
$\sqrt{\frac{\sum(x-\bar{x})^{2}}{(n-1)}}$

## Example

Suppose 10 tools stamped from the same machine during a production run are collected as a random sample and measured for breaking strength.

[St6], [St7], s [St8], [St9], th
[St10])

## STDEVP

Calculates standard deviation based on the entire population given as arguments. The standard deviation is a measure of how widely values are dispersed from the average value (the mean).

## Syntax

STDEVP(number1,number2, ...)
Number1,number2, ... are 1 to 30 number arguments corresponding to a population.

## Remarks

Logical values such as TRUE and FALSE and text are ignored. If logical values and text must not be ignored, use the STDEVPA spreadsheet function.

STDEVP assumes that its arguments are the entire population. If your data represents a sample of the population, then compute the standard deviation using STDEV.

For large sample sizes, STDEV and STDEVP return approximately equal values.

The standard deviation is calculated using the "biased" or "n" method.
STDEVP uses the following formula:
$\sqrt{\frac{\sum(x-\bar{x})^{2}}{n}}$

## Example

 1345130113681322131013701318135013031299 =STDEVP([St1], ऽ

## STDEVPA

Calculates standard deviation based on the entire population given as arguments, including text and logical values. The standard deviation is a measure of how widely values are dispersed from the average value (the mean).

## Syntax

STDEVPA(value1,value2, ...)
Value1,value2,... are 1 to 30 values corresponding to a population.

## Remarks

STDEVPA assumes that its arguments are the entire population. If your data represents a sample of the population, you must compute the standard deviation using STDEVA.

Arguments that contain TRUE evaluate as 1; arguments that contain text or FALSE evaluate as 0 (zero). If the calculation must not include text or logical values, use the STDEVP spreadsheet function instead.

For large sample sizes, STDEVA and STDEVPA return approximately equal values.

The standard deviation is calculated using the "biased" or "n" method.
STDEVPA uses the following formula:

$$
\sqrt{\frac{\sum(x-\bar{x})^{2}}{n}}
$$

## Example



1345130113681322131013701318135013031299 =STDEVPA([St1],

## TDIST

Returns the Percentage Points (probability) for the Student t-distribution where a numeric value ( $x$ ) is a calculated value of $t$ for which the Percentage Points are to be computed. The t-distribution is used in the hypothesis testing of small sample data sets. Use this function in place of a table of critical values for the t-distribution.

## Syntax

## TDIST(x,degrees_freedom,tails)

X is the numeric value at which to evaluate the distribution.
Degrees_freedom is an integer indicating the number of degrees of freedom.

Tails specifies the number of distribution tails to return. If tails $=1$, TDIST returns the one-tailed distribution. If tails $=2$, TDIST returns the two-tailed distribution.

## Remarks

If any argument is nonnumeric, TDIST returns the \#VALUE! error value.
If degrees_freedom < 1, TDIST returns the \#NUM! error value.
The degrees_freedom and tails arguments are truncated to integers.
If tails is any value other than 1 or 2, TDIST returns the \#NUM! error value.

TDIST is calculated as TDIST $=p(x<a b s(X))$, where $X$ is a random variable that follows the $t$-distribution.

## Example

| $\mathbf{X}$ | Degrees | Formula |
| :--- | :--- | :--- |
| 1.9660 | =TDIST([X], | Description (Result) |
|  | [Degrees],2) | Two-tailed distribution (0.054644927 or |
| 1.9660 | =TDIST([X], | One-tailed distribution (0.027322463 or |
|  | [Degrees],1) | 2.73 percent) |

## TINV

Returns the t-value of the Student's t-distribution as a function of the probability and the degrees of freedom.

## Syntax

TINV(probability,degrees_freedom)
Probability is the probability associated with the two-tailed Student's tdistribution.

Degrees freedom is the number of degrees of freedom to characterize the distribution.

## Remarks

If either argument is nonnumeric, TINV returns the \#VALUE! error value.
If probability < 0 or if probability > 1, TINV returns the \#NUM! error value.
If degrees_freedom is not an integer, it is truncated.
If degrees_freedom < 1, TINV returns the \#NUM! error value.
TINV is calculated as TINV $=p(t<X)$, where $X$ is a random variable that follows the $t$-distribution.

A one-tailed t-value can be returned by replacing probability with $2 *$ probability. For a probability of 0.05 and degrees of freedom of 10 , the two-tailed value is calculated with $\operatorname{TINV}(0.05,10)$, which returns 2.28139. The one-tailed value for the same probability and degrees of freedom can be calculated with $\operatorname{TINV}\left(2^{*} 0.05,10\right)$, which returns 1.812462 .

Note In some tables, probability is described as (1-p).
TINV uses an iterative technique for calculating the function. Given a probability value, TINV iterates until the result is accurate to within $\pm$ $3 \times 10^{\wedge}-7$. If TINV does not converge after 100 iterations, the function returns the \#N/A error value.

## Example

## Probability Degrees Formula Description (Result)

$0.05464560=$ TINV ([Probability], $t$-value of the Student's $t-$

## VAR

Estimates variance based on a sample.

## Syntax

VAR(number1,number2, ...)
Number1,number2, ... are 1 to 30 number arguments corresponding to a sample of a population.

## Remarks

VAR assumes that its arguments are a sample of the population. If your data represents the entire population, then compute the variance using VARP.

Logical values such as TRUE and FALSE and text are ignored. If logical values and text must not be ignored, use the VARA function.

VAR uses the following formula:

$$
\frac{\sum(x-\bar{x})^{2}}{(n-1)}
$$

## Example

Suppose 10 tools stamped from the same machine during a production run are collected as a random sample and measured for breaking strength.
 1345130113681322131013701318135013031299 =VAR([St1], Variaı [St2], [St3], the br [St4], [St5], strenç [St6], [St7], tools [St8], [St9], (754.: [St10])

## VARA

Estimates variance based on a sample. In addition to numbers, text and logical values such as TRUE and FALSE are included in the calculation.

## Syntax

VARA(value1,value2, ...)
Value1,value2, ... are 1 to 30 value arguments corresponding to a sample of a population.

## Remarks

VARA assumes that its arguments are a sample of the population. If your data represents the entire population, you must compute the variance using VARPA.

Arguments that contain TRUE evaluate as 1; arguments that contain text or FALSE evaluate as 0 (zero). If the calculation must not include text or logical values, use the VAR function instead.

VARA uses the following formula:

$$
\frac{\sum_{(n-1)}(x-\bar{x})^{2}}{}
$$

## Example

Suppose 10 tools stamped from the same machine during a production run are collected as a random sample and measured for breaking strength.

| St1 | St2 | St3 | St4 | St5 | St6 | St7 | St8 | St9 | St10 | Formula | Des (Re: |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1345130113681322131013701318135013031299 -VARA ([St1], Esti |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  | [St2], [St3], | varia |
|  |  |  |  |  |  |  |  |  |  | [St4], [St5], | the 1 |
|  |  |  |  |  |  |  |  |  |  | [St6], [St7], | stre |
|  |  |  |  |  |  |  |  |  |  | [St8], [St9], | (75 |

## VARP

Calculates variance based on the entire population.
Syntax
VARP(number1,number2, ...)
Number1,number2, ... are 1 to 30 number arguments corresponding to a population.

Logical values such as TRUE and FALSE and text are ignored. If logical values and text must not be ignored, use the VARPA function.

## Remarks

VARP assumes that its arguments are the entire population. If your data represents a sample of the population, then compute the variance using VAR.

The equation for VARP is:

$$
\frac{\sum(x-\bar{x})^{2}}{n}
$$

## Example

Suppose all 10 tools stamped from the same machine during a production run are collected and measured for breaking strength.


1345130113681322131013701318135013031299 =VARP([St1], Vari
[St2], [St3], bré
[St4], [St5], stre|
[St6], [St7], for a
[St8], [St9], tools
[St10]) assı
that
tool:
proc

## VARPA

Calculates variance based on the entire population. In addition to numbers, text and logical values such as TRUE and FALSE are included in the calculation.

## Syntax

VARPA(value1,value2, ...)
Value1,value2,... are 1 to 30 value arguments corresponding to a population.

## Remarks

VARPA assumes that its arguments are the entire population. If your data represents a sample of the population, you must compute the variance using VARA.

Arguments that contain TRUE evaluate as 1; arguments that contain text or FALSE evaluate as 0 (zero). If the calculation must not include text or logical values, use VARP instead.

The equation for VARPA is :
$\frac{\sum(x-\bar{x})^{2}}{n}$

## Example

Suppose all 10 tools stamped from the same machine during a production run are collected and measured for breaking strength.


1345130113681322131013701318135013031299 =VARPA([St1], Va

## WEIBULL

Returns the Weibull distribution. Use this distribution in reliability analysis, such as calculating a device's mean time to failure.

## Syntax

## WEIBULL(x,alpha,beta,cumulative)

$X$ is the value at which to evaluate the function.
Alpha is a parameter to the distribution.
Beta is a parameter to the distribution.
Cumulative determines the form of the function.

## Remarks

If $x$, alpha, or beta is nonnumeric, WEIBULL returns the \#VALUE! error value.

If $x<0$, WEIBULL returns the \#NUM! error value.
If alpha $\leq 0$ or if beta $\leq 0$, WEIBULL returns the \#NUM! error value.
The equation for the Weibull cumulative distribution function is:
$\mathrm{F}(x ; \alpha, \mathcal{A}, \vec{A})=1-\mathrm{e}^{-(x|x|]^{1}}$
The equation for the Weibull probability density function is:

When alpha $=1$, WEIBULL returns the exponential distribution with:
$t=\frac{1}{B}$

## Example

| X Alpha Beta Formula | Description (Result) |  |
| :--- | :--- | :--- |
| $10520 \quad 100$ | =WEIBULL([X], | Weibull cumulative distribution |
|  | [Alpha], | function for the specified arguments |
|  | [Beta],TRUE) | $(0.929581)$ |

$10520100=$ WEIBULL([X], Weibull probability density function for

## ASC

For Double－byte character set（DBCS）languages，changes full－width （double－byte）characters to half－width（single－byte）characters．

## Syntax

ASC（text）
Text is the text or a column reference that contains the text you want to change．If text does not contain any full－width letters，text is not changed．

## Examples

＝ASC（＂EXCEL＂）equals＂EXCEL＂
＝ASC（＂エクセル＂）equals＂エ夗＂

## CHAR

Returns the character specified by a number. Use CHAR to translate code page numbers you might get from files on other types of computers into characters.

Syntax

## CHAR(number)

Number is a number between 1 and 255 specifying which character you want. The character is from the character set used by your computer.

## Example

## Formula Description (Result)

$=$ CHAR(65) Displays the 65 character in the set (A)
$=$ CHAR(33) Displays the 33 character in the set (!)

## CLEAN

Removes all nonprintable characters from text. Use CLEAN on text imported from other applications that contains characters that may not print with your operating system. For example, you can use CLEAN to remove some low-level computer code that is frequently at the beginning and end of data files and cannot be printed.

## Syntax

CLEAN(text)
Text is any information from which you want to remove nonprintable characters.

## Example

| Col1 | Formula | Description (Result) |
| :---: | :---: | :---: |
| CHAR(7)\&"text" | CLEAN([Col1]) | Removes the nonprintable character, $\mathrm{CHAR}(7)$, from the string (text). |

## CODE

Returns a numeric code for the first character in a text string. The returned code corresponds to the character set used by your computer.

Syntax

## CODE(text)

Text is the text for which you want the code of the first character in the text string.

## Example

Formula Description (Result)
=CODE("A") Displays the numeric code for A (65)
$=\operatorname{CODE}($ "!") Displays the numeric code for ! (33)

## CONCATENATE

Joins several text strings into one text string.

## Syntax

CONCATENATE (text1,text2,...)
Text1, text2, ... are 1 to 30 text items to be joined into a single text item. The text items can be text strings, numbers, or column references.

## Remarks

The "\&" operator can be used instead of CONCATENATE to join text items.

## Example

## Col1 Col2 Col3 Formula <br> Description

 brook species 32 =CONCATENATE("Stream Concatenates a sentence trout population for ",[Col1]," ", from the data (Stream [Col2]," is ",[Col3],"/mile") population for brook trout species is $32 /$ mile)
## DOLLAR

Converts a number to text using currency format, with the decimals rounded to the specified place. The format used is $\$ \#, \# \# 0.00 \_$); (\$\#,\#\#0.00).

## Syntax

## DOLLAR(number,decimals)

Number is a number, a colimn reference containing a number, or a formula that evaluates to a number.

Decimals is the number of digits to the right of the decimal point. If decimals is negative, number is rounded to the left of the decimal point. If you omit decimals, your system locale setting will be used to determine the number of decimal places.

## Remark

The Dollar function uses the currency setting of your computer. If you always want to show U.S. currency, use the USDOLLAR function instead.

## Example

| Col1 | Formula | Description (Result) |
| :---: | :---: | :---: |
| 1234.567 | =DOLLAR([Col1], <br> 2) | Displays the first number in a currency format, 2 digits to the right of the decimal point $(\$ 1,234.57)$ |
| 1234.567 | $\begin{aligned} & =\mathrm{DOLLAR}([\mathrm{Col} 1], \\ & -2) \end{aligned}$ | Displays the first number in a currency format, 2 digits to the left of the decimal point $(\$ 1,200)$ |
| $-1234.56$ | $\begin{aligned} & =\text { DOLLAR }([\text { Col1] } \\ & -2) \end{aligned}$ | Displays the second number in a currency format, 2 digits to the left of the decimal point ((\$1,200)) |
| -0.123 | $=$ DOLLAR ([Col1], <br> 4) | Displays the third number in a currency format, 4 digits to the right of the decimal point((\$0.1230)) |
| 99.888 | =DOLLAR([Col1]) | Displays the fourth number in a currency format, 2 digit to the left of the decimal point (\$99.89) |

## EXACT

Compares two text strings and returns TRUE if they are exactly the same, FALSE otherwise. EXACT is case-sensitive. Use EXACT to test text being entered into a document.

## Syntax

## EXACT(text1,text2)

Text1 is the first text string.
Text2 is the second text string.

## Example

| Col1 | Col2 Formula | Description (Result) |
| :---: | :---: | :---: |
| w | word =EXACT([Col1], [Col2]) | Checks whether the strings match (TRUE) |
| Wor | word =EXACT([Col1], [Col2] | Checks whether the strings match (FALSE) |
| w ord | word =EXACT([Col1], [Col2]) | Checks whether the strings match (FALSE) |

## FIND

Finds one text string (find_text) within another text string (within_text), and returns the number of the starting position of find_text, from the first character of within_text. You can also use SEARCH to find one text string within another, but unlike SEARCH, FIND is case sensitive and doesn't allow wildcard characters.

## Syntax

FIND(find_text,within_text,start_num)
Find_text is the text you want to find.
Within_text is the text containing the text you want to find.
Start_num specifies the character at which to start the search. The first character in within_text is character number 1. If you omit start_num, it is assumed to be 1.

- Tip


## Remarks

If find_text is "" (empty text), FIND matches the first character in the search string (that is, the character numbered start_num or 1).

Find_text cannot contain any wildcard characters.
If find_text does not appear in within_text, FIND returns the \#VALUE! error value.

If start_num is not greater than zero, FIND returns the \#VALUE! error value.

If start_num is greater than the length of within_text, FIND returns the \#VALUE! error value.

## Example 1

## Formula Description (Result)

=FIND("M","Miriam Position of the first "M" in the string (1)
McGovern")
=FIND("m","Miriam Position of the first "m" in the string (6)

McGovern")
=FIND("M","Miriam Position of the first " M " in the string, starting with
McGovern",3) the third character (8)

## Example 2

| Col1 | Formula | Description (Result) |
| :---: | :---: | :---: |
| Ceramic Insulators \#124-TD45-87 | $\begin{aligned} & =\mathrm{MID}([\text { Col1],1,FIND(" } \\ & \text { \#",[Col1],1)-1) } \end{aligned}$ | Extracts text from position 1 to the position of " \#" in the string <br> (Ceramic Insulators) |
| $\begin{aligned} & \text { Copper Coils } \\ & \text { \#12-671-6772 } \end{aligned}$ | $\begin{aligned} & =\mathrm{MID}([\text { Col1],1,FIND(" } \\ & \text { \#",[Col1],1)-1) } \end{aligned}$ | Extracts text from position 1 to the position of " \#" in the string (Copper Coils) |
| Variable <br> Resistors <br> \#116010 | $\begin{aligned} & =\mathrm{MID}([\mathrm{Col} 1], 1, \mathrm{FIND} \\ & \text { \#",[Col1],1)-1) } \end{aligned}$ | Extracts text from position 1 to the position of " \#" in the string (Variable Resistors) |

## FIXED

Rounds a number to the specified number of decimals, formats the number in decimal format using a period and commas, and returns the result as text.

## Syntax

FIXED(number,decimals,no_commas)
Number is the number you want to round and convert to text.
Decimals is the number of digits to the right of the decimal point.
No_commas is a logical value that, if TRUE, prevents FIXED from including commas in the returned text.

## Remarks

If decimals is negative, number is rounded to the left of the decimal point.
If you omit decimals, your system locale setting will be used to determine the number of decimal places.

If no_commas is FALSE or omitted, then the returned text includes commas as usual.

## Example

## Formula Description (Result)

=FIXED(1234.567, Rounds the first number 1 digit to the right of the 1) decimal point $(1,234.6)$
$=$ FIXED(1234.567, Rounds the first number 1 digit to the left of the
-1) decimal point $(1,230)$
=FIXED(-1234.567, Rounds the second number 1 digit to the left of the
-1, TRUE) decimal point, without commas (-1230)
$=$ FIXED(44.332) Rounds the third number 2 digits to the left of the decimal point (44.33)

## LEFT

LEFT returns the first character or characters in a text string, based on the number of characters you specify.

## Syntax

LEFT(text,num_chars)
Text is the text string that contains the characters you want to extract.
Num_chars specifies the number of characters you want LEFT to extract.
Num_chars must be greater than or equal to zero.
If num_chars is greater than the length of text, LEFT returns all of text.
If num_chars is omitted, it is assumed to be 1 .

## Example

| Col1 | Formula | Description (Result) |
| :--- | :--- | :--- |
| Sale Price | $=\operatorname{LEFT}([$ Col1 $], 4)$ | First four characters in the string (Sale) |
| Sweden | $=$ LEFT([Col1]) | First character in the string (S) |

## LEN

LEN returns the number of characters in a text string.

## Syntax

## LEN(text)

Text is the text whose length you want to find. Spaces count as characters.

## Example

Col1 Formula Description (Result)

Phoenix, $=$ LEN([Col1]) Length of the string (11)
AZ
$=\mathrm{LEN}([\mathrm{Col} 1])$ Length of the string (0)
A One $=\mathrm{LEN}([\mathrm{Col} 1])$ Length of the string, which includes 5 spaces (8)

## LOWER

Converts all uppercase letters in a text string to lowercase.

## Syntax

LOWER(text)
Text is the text you want to convert to lowercase. LOWER does not change characters in text that are not letters.

## Example

| Col1 | Formula | Description (Result) |
| :--- | :--- | :--- |
| E. E. Cummings $=$ LOWER([Col1]) <br> Lower case of string (e. e. cummings)  <br> Apt. 2 B $=\operatorname{LOWER}([\mathrm{Col} 1])$ <br> Lower case of string (apt. 2b)  |  |  |

## MID

MID returns a specific number of characters from a text string, starting at the position you specify, based on the number of characters you specify.

## Syntax

MID(text,start_num,num_chars)
Text is the text string containing the characters you want to extract.
Start_num is the position of the first character you want to extract in text. The first character in text has start_num 1, and so on.

Num_chars specifies the number of characters you want MID to return from text.

## Remarks

If start_num is greater than the length of text, MID returns "" (empty text).
If start_num is less than the length of text, but start_num plus num_chars exceeds the length of text, MID returns the characters up to the end of text.

If start_num is less than 1, MID returns the \#VALUE! error value.
If num_chars is negative, MID returns the \#VALUE! error value.

## Example

## Formula Description (Result)

=MID("Fluid Five characters from the string, starting at the first
Flow",1,5) character (Fluid)
=MID("Fluid Twenty characters from the string, starting at the seventh
Flow",7,20) (Flow)
=MID("Fluid Because the starting point is greater than the length of Flow",20,5) the string, empty text is returned ()

## PROPER

Capitalizes the first letter and any other letters that follow a non-letter character in a text string. Converts all other letters in the text string to lowercase letters.

Syntax

## PROPER(text)

Text is text enclosed in quotation marks, a formula that returns text, or a column reference containing the text you want to partially capitalize.

## Example

| Formula | Description (Result) |
| :--- | :--- |
| =PROPER("this is a TITLE") | Proper case of string (This Is A Title) |
| =PROPER("2-cent's worth") | Proper case of string (2-Cent'S Worth) |
| =PROPER("76BudGet") | Proper case of string (76Budget) |

## REPLACE

REPLACE replaces part of a text string, based on the number of characters you specify, with a different text string.

## Syntax

REPLACE(old_text,start_num,num_chars,new_text)
Old_text is text in which you want to replace some characters.
Start_num is the position of the character in old_text that you want to replace with new_text.

Num_chars is the number of characters in old_text that you want REPLACE to replace with new_text.

New_text is the text that will replace characters in old_text.

## Example

## Formula Description (Result)

=REPLACE("abcdefghijk",6,5,"*") Replaces five characters, starting with the sixth character (abcde*k)
=REPLACE("2009",3,2,"10") Replaces the last two digits of 2009 with 10 (2010)
=REPLACE("123456",1,3,"@") Replaces the first three characters with @ (@456)

## REPT

Repeats text a given number of times. Use REPT to add a number of instances of a text string.

## Syntax

REPT(text,number_times)
Text is the text you want to repeat.
Number_times is a positive number specifying the number of times to repeat text.

## Remarks

If number_times is 0 (zero), REPT returns "" (empty text).
If number_times is not an integer, it is truncated.
The result of the REPT function cannot be longer than 2000 characters, or REPT returns \#VALUE!.

## Example

## Formula Description (Result)

=REPT("*-", 3) Displays the string 3 times (*-*_*-)
=REPT("-",10) Displays a dash 10 times (----------)

## RIGHT

RIGHT returns the last characters in a text string, based on the number of characters you specify.

## Syntax

RIGHT(text,num_chars)
Text is the text string containing the characters you want to extract.
Num_chars specifies the number of characters you want RIGHT to extract.

## Remarks

Num_chars must be greater than or equal to zero.
If num_chars is greater than the length of text, RIGHT returns all of text.
If num_chars is omitted, it is assumed to be 1.

## Example

```
Formula Description (Result)
=RIGHT("Sale Price",5) Last 5 characters of the string (Price)
=RIGHT("Stock Number") Last character of the string (r)
```


## SEARCH

SEARCH returns the number of the character at which a specific character or text string is first found, beginning with start_num. Use SEARCH to determine the location of a character or text string within another text string so that you can use the MID or REPLACE functions to change the text.

## Syntax

SEARCH(find_text,within_text,start_num)
Find_text is the text you want to find. You can use the wildcard characters- question mark (?) and asterisk (*) in find_text. A question mark matches any single character; an asterisk matches any sequence of characters. If you want to find an actual question mark or asterisk, type a tilde ( $\sim$ ) before the character.

Within_text is the text in which you want to search for find_text.
Start_num is the character number in within_text at which you want to start searching.

- Tip


## Remarks

SEARCH does not distinguish between uppercase and lowercase letters when searching text.

SEARCH is similar to FIND except that FIND is case sensitive.
If find_text is not found, the \#VALUE! error value is returned.
If start_num is omitted, it is assumed to be 1.
If start_num is not greater than 0 (zero) or is greater than the length of within_text, the \#VALUE! error value is returned.

## Example

| Col1 | Col2 | Col3 | Formula |
| :--- | :--- | :--- | :--- | | Descripti |
| :--- |
| (Result) |


| Margin | the first "e in the strir starting at the sixth position |
| :---: | :---: |
| Statements Profit margin =SEARCH([Col2],[Col3]) Margin | Position o <br> "margin" <br> "Profit <br> Margin" |
| Statements Profit margin $=$ REPLACE ([Col3],SEARCH([Col3] Margin $\quad[$ Col2]), $6, " A m o u n t ") ~$ | Replaces <br> "Margin" with <br> "Amount" (Profit Amount) |

## T

Returns the text referred to by value.
Syntax
T(value)
Value is the value you want to test.

## Remarks

If value is or refers to text, T returns value. If value does not refer to text, T returns "" (empty text).

You do not generally need to use the $T$ function in a formula because values are generally converted as necessary.

## Example

| Formula | Description (Result) |
| :--- | :--- |
| $=\mathrm{T}($ "Rainfall") | Because the value is text, the text is returned (Rainfall) |
| $\mathrm{T}(19)$ | Because the value is a number, empty text is returned () |
| $\mathrm{T}($ TRUE $)$ | Because the value is a logical value, empty text is returned |
|  | () |

## TEXT

Converts a value to text in a specific number format.

## Syntax

TEXT(value,format_text)
Value is a numeric value, a formula that evaluates to a numeric value, or a column reference containing a numeric value.

Format_text is a number format in text format.

## Remarks

Using the TEXT function converts a value to formatted text, and the result is no longer calculated as a number.

## Example

| Salesperso | Sa | ormula | Description (Result) |
| :---: | :---: | :---: | :---: |
| Buchanan | 2800 | =[Salesperson]\&" sold "\&TEXT([Sales], "\$0.00; (\$0.00)")\&" worth of units." | Combines contents into a phrase (Buchanan sold \$2,800.00 worth of units.) |
| Dodsworth | . 4 | =[Salesperson]\&" sold "\&TEXT([Sales],"0.00\%")\&" of the total sales." | Combines contents into a phrase (Dodsworth sold $40.00 \%$ of the total sales.) |

## TRIM

Removes all spaces from text except for single spaces between words. Use TRIM on text that you have received from another application that may have irregular spacing.

Syntax
TRIM(text)
Text is the text from which you want spaces removed.

## Example

Formula Description (Result)
=TRIM(" First Removes leading and trailing spaces from the text in Quarter Earnings ") the formula (First Quarter Earnings)

## UPPER

Converts text to uppercase.

## Syntax

UPPER(text)
Text is the text you want converted to uppercase. Text can be a column reference or text string.

## Example

Formula Description (Result)
=UPPER("total") Upper case of string (TOTAL)
=UPPER("Yield") Upper case of string (YIELD)

## USDOLLAR

Converts a number to text using currency format, with the decimals rounded to the specified place. The format used is \$\#,\#\#0.00_); (\$\#,\#\#0.00).

## Syntax

## USDOLLAR(number,decimals)

Number is a number, a column reference containing a number, or a formula that evaluates to a number.

Decimals is the number of digits to the right of the decimal point. If decimals is negative, number is rounded to the left of the decimal point. If you omit decimals, your system locale setting will be used to determine the number of decimal places.

## Remark

The USDOLLAR function always shows U.S. currency. If you want to show the currency setting of your computer, use the DOLLAR function instead.

## Example

| Col1 | Formula | Description (Result) |
| :--- | :--- | :--- |
| 1234.567 |  |  |
| =USDOLLAR([Col1], |  |  |
| 2) |  |  | | Displays the first number in a currency |
| :--- | :--- |
| format, 2 digits to the right of the decimal |
| point (\$1,234.57) |

point (\$99.89)

## VALUE

Converts a text string that represents a number to a number.

## Syntax

## VALUE(text)

Text is the text enclosed in quotation marks or a column reference containing the text you want to convert.

## Remarks

Text can be in any of the constant number, date, or time formats. If text is not in one of these formats, VALUE returns the \#VALUE! error value.

## Example

## Formula Description (Result)

=VALUE("\$1,000") Number equivalent of the string (1000)
=VALUE("16:48:00")- The serial number equivalent to 4 hours and 48
VALUE("12:00:00") minutes, which is "16:48:00"-"12:00:00" (0.2 or 4:48)

## Troubleshoot international support

This topic covers issues with international support that are specific to Datasheet view. For information on international support for lists, see Microsoft Windows SharePoint Services Help. To display Windows SharePoint Services Help, click Help on the page toolbar.

## The Datasheet view defaults to the US English locale, instead of the server-specified locale.

This could be because the operating system installed on your computer is Microsoft Windows 2000. Windows SharePoint Services supports 136 locales, 10 more than what is supported by your operating system. If the server locale is one of the following, the Datasheet view on your computer will default to US English.

Divehi - Maldives
Galician - Spain
Gujarati - India
Kannada - India
Kyrgyz (Cyrillic) - Republic of Kyrgyzstan
Mongolian (Cyrillic) - Mongolia
Punjabi (Gurmukhi) - India
Syriac - Syria
Telugu - India
Invariant locale

## I get the message 'Leaving or refreshing the list with pending changes'

You are attempting to refresh, navigate away from the list, or make changes to a calculated column. Some of the changes you made to the list have not yet been submitted to the server.
You can do one of the following:
Click Yes to wait while the changes are sent to the server. If any conflicts or errors result from submitting changes to the server, you will be able to resolve the conflicts and errors, and retry sending changes to the server.
Click No to continue with your last action immediately. You will lose some or all of the changes that have not yet been submitted to the server. You will also not be able to resolve conflicts or errors arising from the changes that have already been submitted to the server.

## I get the message 'List structure has changed'

When two users make changes to the structure of a list at the same time, the user who submits a change first will succeed in committing his or her changes, but the second user will be notified of a change in list structure.
The following table summarizes the scenarios in which you will be informed of a change in list structure.

User A User B
Deletes a column Updates data in the same column
Changes the data type of a column Adds or updates data with type mismatch
Adds, renames, or deletes a column, changes a column's data type or other properties
Makes list-level changes, such as
Edits a calculated column renames the list, changes its description or security settings, rearranges the columns, enables or disables attachments, or adds the list to the Quick Launch bar Edits a calculated column

Edits a calculated column
Adds, renames, or deletes a column, changes a column's data type or other properties

Note User B must be on the Add Column or Change Column page before User A starts editing the calculated column.

Makes list-level changes, such as renames the list, changes its description or security settings, rearranges the columns, enables or disables attachments, or adds the list to the Quick Launch bar

Note User B must be on the List

Settings page before user A starts editing the calculated column.

You can resolve a structural conflict by refreshing the list. When the list is refreshed, your changes will be discarded, and your view will be updated with the latest version of the list. After refreshing the list, simply repeat your changes.

## I get the message 'Stop submitting changes'

You are attempting to stop the process of submitting your changes to the server before refreshing, navigating away from the list, or making changes to a calculated column. You can do one of the following:
Click Yes to stop the list from submitting changes to the server. You will lose the changes that have not yet been saved by the server. You will also not be able to resolve conflicts or errors arising from the changes that have already been submitted to the server.

Click No to continue with submitting changes. You will be able to resolve resulting conflicts and errors, and resend your changes to the server.

## I get the message 'Submit pending changes'

The list is attempting to submit your changes to the server before continuing with your request to refresh, navigate away from the list, or edit a calculated column. You can do one of the following:
Wait until all changes are submitted to the server. This will allow you to resolve conflicts and errors, and resend your changes to the server, if necessary.

Discard your changes by clicking Cancel. If you click Cancel, you will be asked to confirm whether you want to stop sending changes to the server. If you click Yes, you will lose the changes that have not yet been saved by the server. You will also not be able to resolve conflicts or errors arising from the changes that have already been submitted to the server.

## I get the message 'Unable to retrieve data'

The view retrieves data in batches of 100 rows. It is unable to fetch the next batch of data due to one of the following reasons:

The server is busy.
The server is not found.
The server timed out.
Some other error occurred.
Close the list and try viewing the list at a later time.

## Status bar displays 'Pending changes'

When editing the contents of a list, you need not wait until your previous change is submitted to the server to make another change. While you are making changes to the data, the list keeps submitting your changes to the server in the background. If you bulk edit several cells, such as filling several rows of a column by dragging the drag fill handle, the list might take several seconds to send all the changes to the server. In such situations, it displays the Pending changes link in the status bar.

Seeing this link does not mean you need to postpone adding or editing data until all previous changes get submitted. However, if you attempt to edit the formula in a calculated column, or refresh or close the view, you will see a message requesting you to wait until your changes are submitted to the server.

## Status bar displays 'Read-only' or 'This view is read-only'

The selected cell, column, row, or the entire view is read-only. You cannot edit a cell, column, or row that is marked read-only. If the entire view is read-only, you cannot edit any portion of the view.

Portions of a view, or an entire view, might be read-only due to one or more of the following reasons:
Certain columns, such as Created By and Modified, are always readonly. Values for these columns are entered automatically.

The changes you made to the selected row or column have been submitted to the server. If there is no conflict or error, you will be able to edit the row or column after the changes have been saved.

There is an unresolved conflict or error in the selected row or column. Resolve the conflict or error before attempting to edit the selected row or column.

The list is set up to require content approval, and you are viewing the list in the All Items view.

In the My Submissions view of a list that requires content approval, the Approval Status and Comment column are read-only. Only a user with Manage Lists right can edit these two columns.

Attachments are read-only in a list that requires content approval. You cannot view or edit attachments in any of the views.

The document in the current row has been checked out by a user. You cannot edit the columns in the row until the user checks the document in.

You do not have permission to edit the column or row. Contact the list author for more information.

## Status bar displays 'Retrieving data'

The list retrieves data in batches of 100 rows. It is attempting to fetch the next batch. This may take some time if the server is busy.

If the server encounters a problem while retrieving data, a message will appear. In that case, close the list, and try again later.

## About international support

Details of international support for lists are covered in Microsoft Windows SharePoint Services Help.
To display Windows SharePoint Services Help, click Help on the page toolbar.

## Reconvert a determined character string in Datasheet view

Note This command is available only if support for Japanese, Simplified Chinese or Traditional Chinese Input Method Editor is enabled on your operation system or through Microsoft Office Language Settings.

You can reconvert a character string that has already been input and converted.

1. Place the insertion point at the beginning or in the middle of the characters you want to reconvert.
2. Right-click the cell, and then click Reconvert on the shortcut menu.
3. Click the desired character, and press ENTER twice.
