

From Data To Plot: A FzzPlot Tutorial

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I. Introduction (and explanations)

This document explains how to prepare data for FzzPlot using MacWrite, and how to load that data using FzzPlot, and prepare and print a plot. This document also explains how to go in the opposite direction — copy a graph from FzzPlot and paste the graph into MacWrite documents, MacDraw drawings, or any other program that supports the pasting of graphics.

This tutorial assumes that you have some familiarity with the basic Macintosh techniques of pointing, clicking, and pulling down menus. If you've never used a Macintosh before, it's recommended that you read the Macintosh User's Guide, and that you take the Guided Tour that's supplied with your computer before you continue.

In addition, this document assumes that you have some familiarity with MacWrite, Apple's standard word processor for the Macintosh, and with MacPaint, MacDraw, or a similar drawing program.

While MacWrite is used to prepare the data in these examples, the techniques demonstrated here will work for any program that allows you to create "text-only" files — files that consist only of letters that you type on the keyboard, with no formatting information.

The demonstrative pictures used in this document are *examples only*. The images you see on your screen will probably be different from what's shown here, especially when you're using the Finder (Macintosh's file-handling application).

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II. Preparing The Data

Turn on your Macintosh, and insert a disk that has MacWrite on it. If you have a hard disk installed, simply turn on the computer.

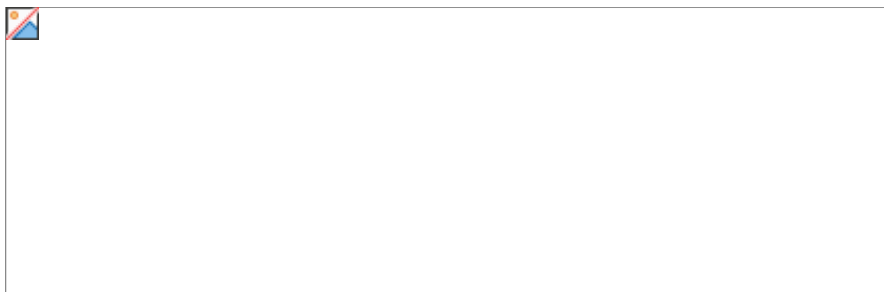
After a few seconds, the Macintosh desktop will appear, with your disk icon in the upper right-hand corner of the screen. If the disk window isn't already open, open it (either double-click on the disk icon or click once on the disk icon and choose "Open" from the **File** menu). The open disk window will look something like this:



Now open the MacWrite application (again, either double-click on its icon or click once in MacWrite's icon and choose "Open" from the **File** menu).

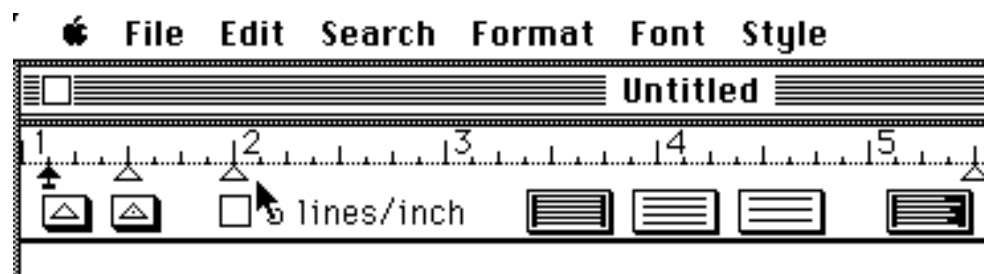
In a few seconds (less if you have a hard disk), you will see a screen that has some menus across the top, and a large window below the menus. This large window is an empty document, waiting for you to type something into it.

The first thing you should do is prepare the document's ruler so that you can easily see your columns of data. If you're only using two columns of data, drag a single tab out to roughly the 1/2-inch mark on the ruler (you can later adjust this setting, if you wish):



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If you're using three columns of data (X value, Y value, and error value), drag two tab markers out: one to the 1/2-inch mark, and one to the 1-inch mark:



At this point, you're ready to type in your data. Before you start typing, some tips are in order:

- Do not put any extra letters (spaces, tabs, or otherwise) before the first number on each line. FzzPlot will ignore any line that does not begin with a digit, a space, a tab, or a sign (plus or minus). This is often a convenient feature, because you can type comments into your data file, or add blank lines for readability, and FzzPlot will ignore them; however, accidentally putting an extra character at the beginning of a line will result in mysteriously missing data points.

- When you type in the values, be sure that for each non-integer value there is at least one digit on each side of the decimal point. For example, the following line is incorrect:

```
.2415      3.0
```

The correct way to type this line would be:

```
0.2415      3.0
```

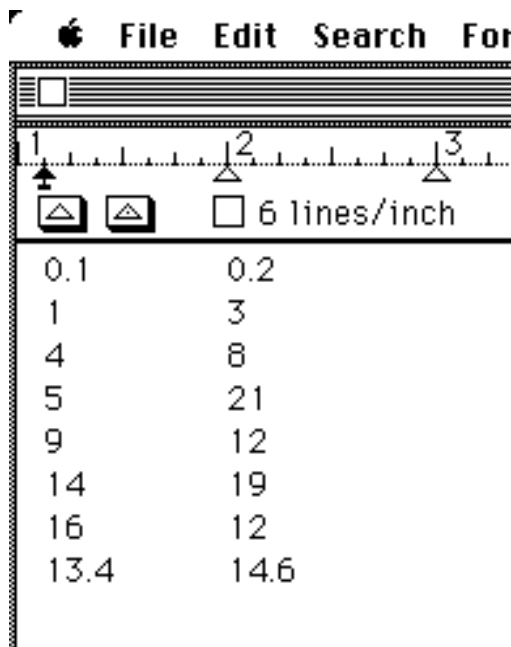
The exception to the rule is for integer values. This line is also a correct way to enter the data:

```
0.2415      3
```

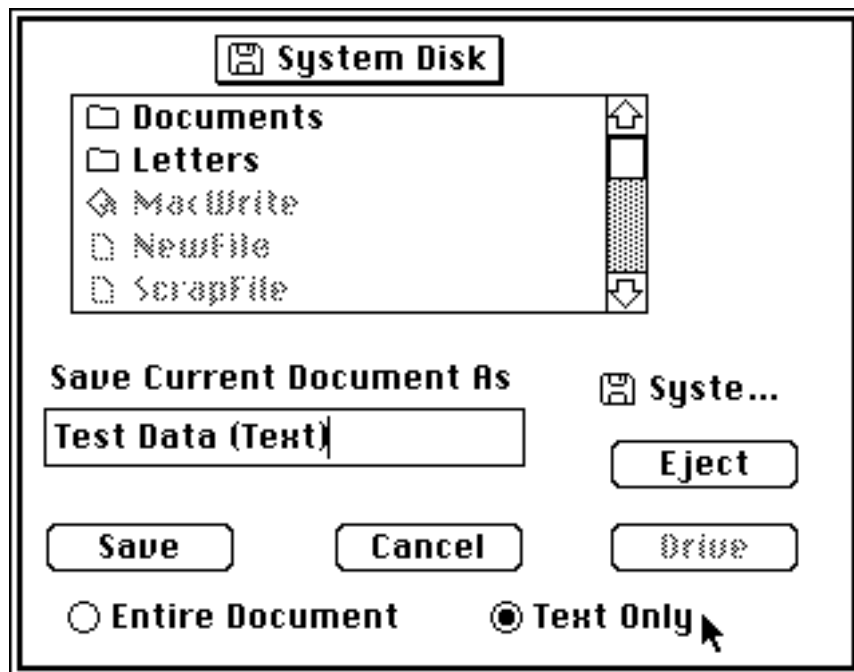
- Both numbers in the an X-Y pair should be on the same line, and there should be only one pair per line. If you are using error values, each triple should be on the same line, and there should be only one triple per line.

Now, type in some numbers...

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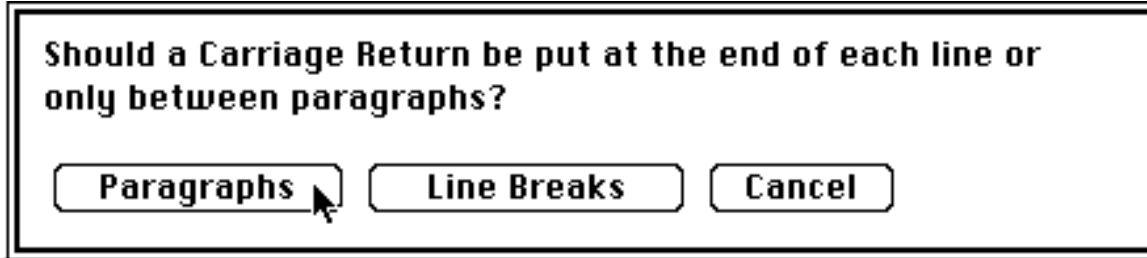
At this point, you can save your file. To save the information in a file that FzzPlot can read, you must save the file as "Text Only". First, pull down "Save" from MacWrite's **File** menu. MacWrite will display a box that lets you give a name for your file, and there are also two circular controls in the box, labeled "Entire Document" and "Text Only". Click in the circle labeled "Text Only". The box should look like this:



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Note that we've named the file "Test Data (Text)". We'll see this name again, when we open the file with FzzPlot.

Click on the "Save" button or press the Return Key. MacWrite will then present another box, asking you whether you want to put carriage returns after paragraph breaks or after line breaks:

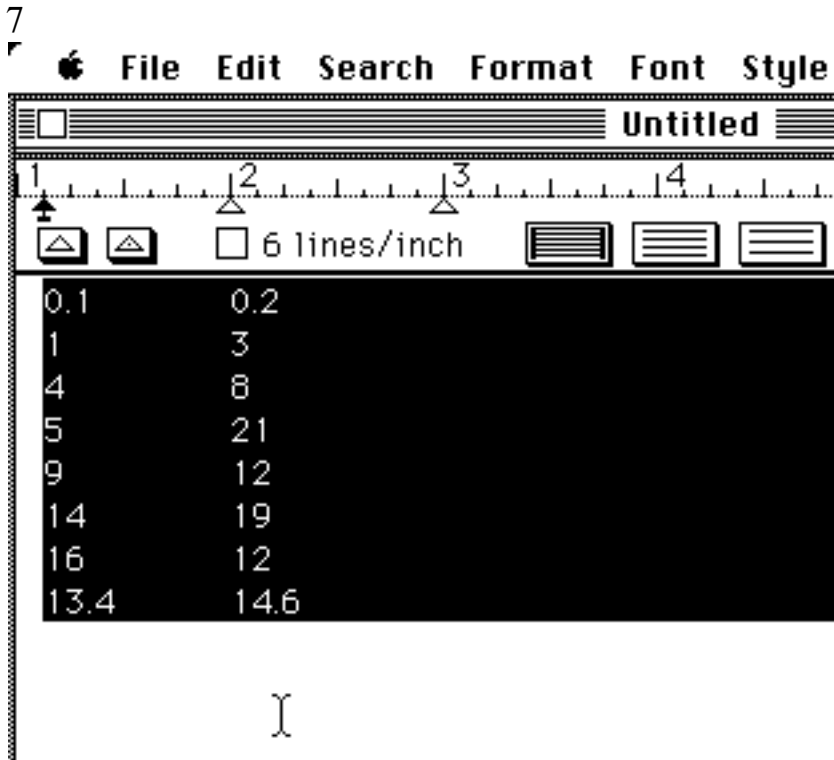


You can click in either button, or in "Cancel" if you don't wish to save your data at all. If you click in the "Line Breaks" button, MacWrite will insert an extra line between each line of data in your file. If you click on "Paragraphs", your data will be saved exactly as it appears on the screen. Since FzzPlot ignores extra blank lines, whichever option you choose is purely a matter of taste.

At this point, you're done preparing data. Choose "Quit" from MacWrite's **File** menu. MacWrite will ask you if you want to save changes before quitting. Since you've already saved your data once, you really don't need to save any changes, unless you want another copy of your data.

If you want to skip the step of creating a separate datafile, you can copy the numbers you've typed in to the Clipboard, and paste them into FzzPlot. Here's how to do it:

Click the mouse once at the very beginning of your data. Next, go to the end of your data (use the gray scroll bar on the right edge of the document's window if you need to). Now, hold down the Shift key (next to the "Z" key on the left, or just below the "Return" key on the right) and click the mouse at the end of your data. The numbers will turn black, like this:



Choose "Copy" from MacWrite's **Edit** menu, then quit MacWrite. If you want a copy of your data, click on the "Yes" button when MacWrite asks you whether you want to save changes. You can save your file as an "Entire Document"; FzzPlot won't be able to read it, but you can open the document again with MacWrite and copy the data out of it, if necessary.

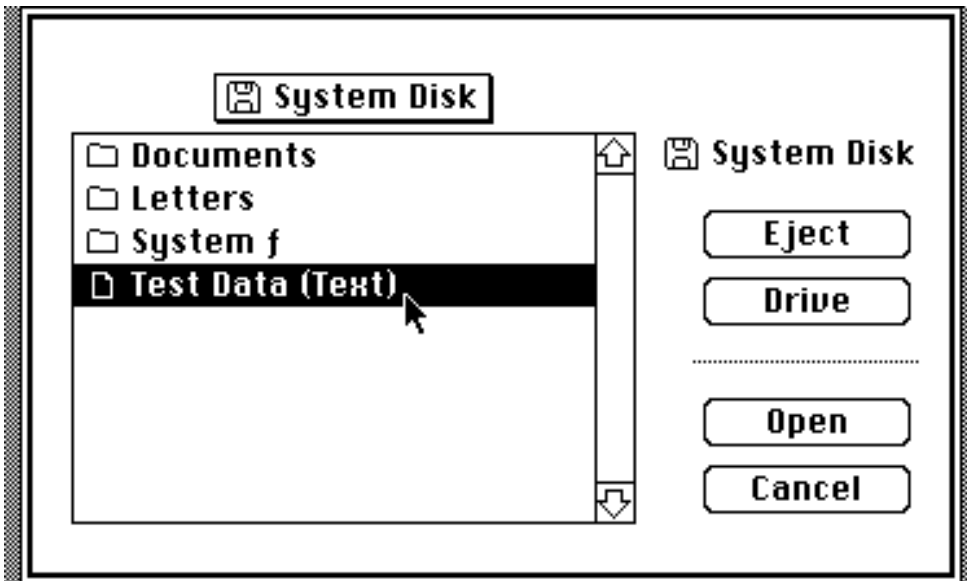
III. Plotting The Data

Now that you've typed in data and saved it in a file, you're ready to plot it. You'll find that preparing a plot of your data is quite a bit simpler than typing in the actual numbers.

First, insert a disk that has FzzPlot on it, if it isn't on a disk that you've already inserted:

Then, open the FzzPlot application icon.

FzzPlot will display an introductory dialog box. Read the contents of this box, then click "OK" or press the Return key to continue. Choose "Open" from FzzPlot's **File** menu. You'll be presented with a list of possible files to open. If you had to eject the disk that had your original data file on it, and you have a single-drive Macintosh, click on the "Eject" button, remove the FzzPlot disk (the system will ask for it when it needs it), and insert the disk that has your datafile on it. Once the disk with the datafile is inserted, the list will look something like this:



To open our sample datafile, either double-click on its name, or click once on its name and click on the "Open" button or press the Return key.

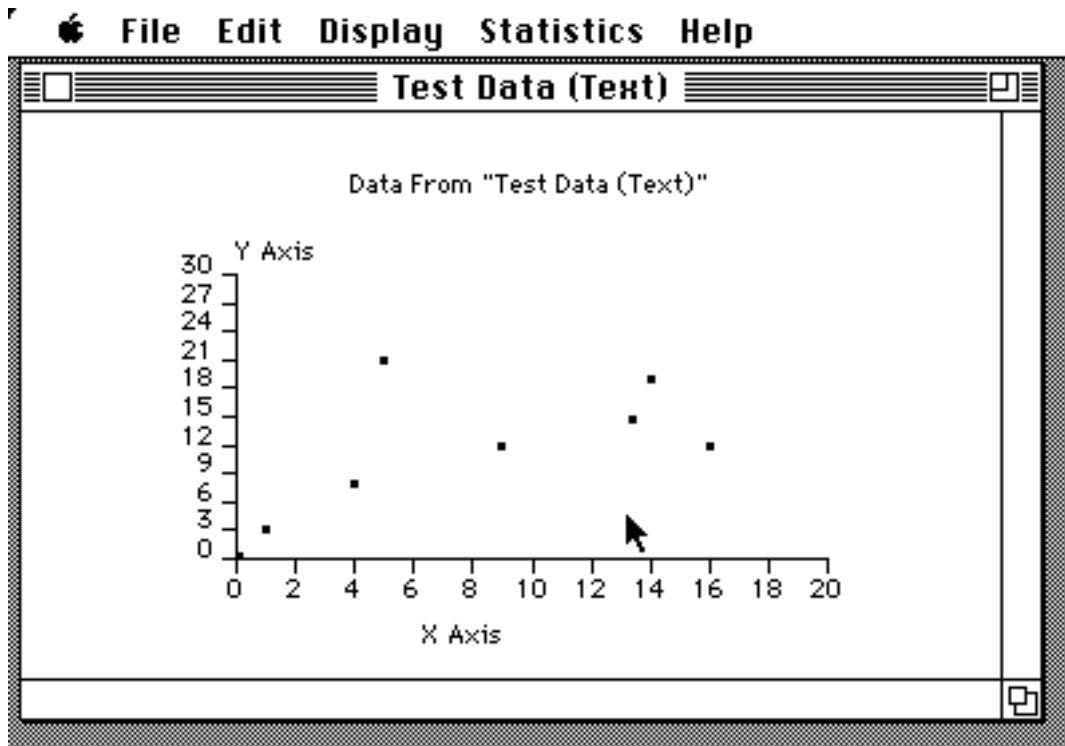
FzzPlot will spring into action, and will display a series of small boxes to let you know what it's doing, and the cursor will spin while it's performing those actions, so that you know the computer is functioning, and that it didn't "hang up" trying to read your data.

After a few seconds, a window will appear on the screen that has your data plotted in it.

If you have copied your data to the clipboard (as described above), you don't need to choose "Open". Instead, choose "Paste" from the **Edit** menu. FzzPlot will behave exactly as if it is loading a text file, except that the window will be titled "Data From the Clipboard".

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And here's our graph:



More than likely, the graph doesn't look like you want it to. To help relieve this problem, FzzPlot offers a set of formatting commands. These commands all reside under the **Display** menu. Here's a quick walk-through of the **Display** menu, and some things to try on your graph:

- "Axis Labels" lets you change the axis and plot titles. When you choose this command, FzzPlot brings up a dialog box like this:

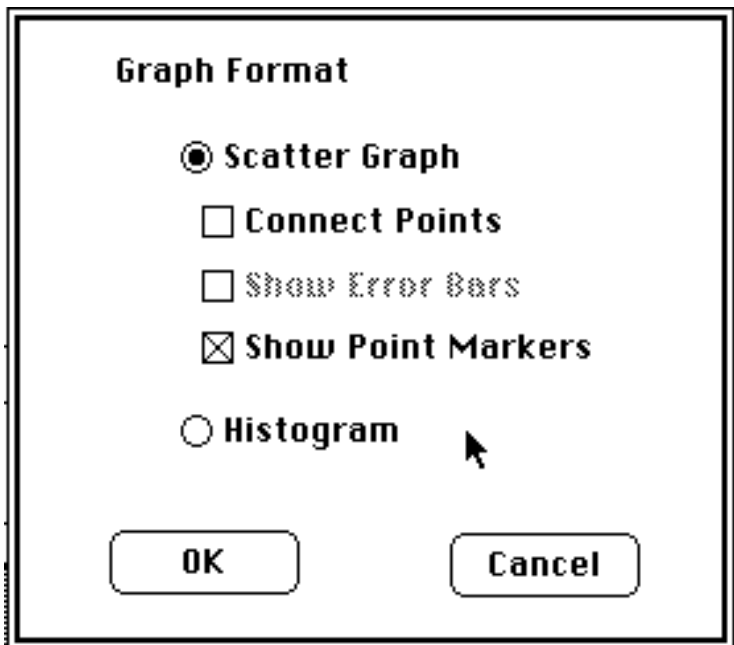
The dialog box is titled "Set Titles:". It contains three text input fields. The first field is labeled "X Axis:" and contains the text "X Axis". The second field is labeled "Y Axis:" and contains the text "Y Axis". The third field is labeled "Plot:" and contains the text "Data From 'Test Data (Text)'". At the bottom of the dialog are two buttons: "OK" and "Cancel". A mouse cursor is pointing at the "Y Axis:" label.

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When a text box (a rectangle with letters in it) is completely black, you can replace what's already in there simply by typing. Press the Tab key to move to the next text box in line. For example, press the Tab key twice to move to the third item in the list (it's the plot title, labeled "Plot:"), and type in a new title for your plot.

- "Axis Limits" allows you to narrow the axis limits to view a smaller slice of your data, or expand the limits. You can also set the number of displayed decimal places for the tick mark labels. (Initially, these are displayed as integers; see "Graph Formats", below.) Clicking in the button labeled "Defaults" will automatically scale the plot (which is done when a plot is created).

- "Set Plot Type" lets you choose the type of plot you want; either a column graph (for histograms) or a scatter graph. When you're plotting a scatter graph, you can display dots to denote the data points (when printed on a LaserWriter, the dots appear as small filled circles, while on the ImageWriter and the Macintosh screen, they appear as squares), you can connect the data points with straight lines, or you can display error bars. If you have no error values in your datafile, this last option will be gray, and clicking on it has no effect. The dialog box looks like this:

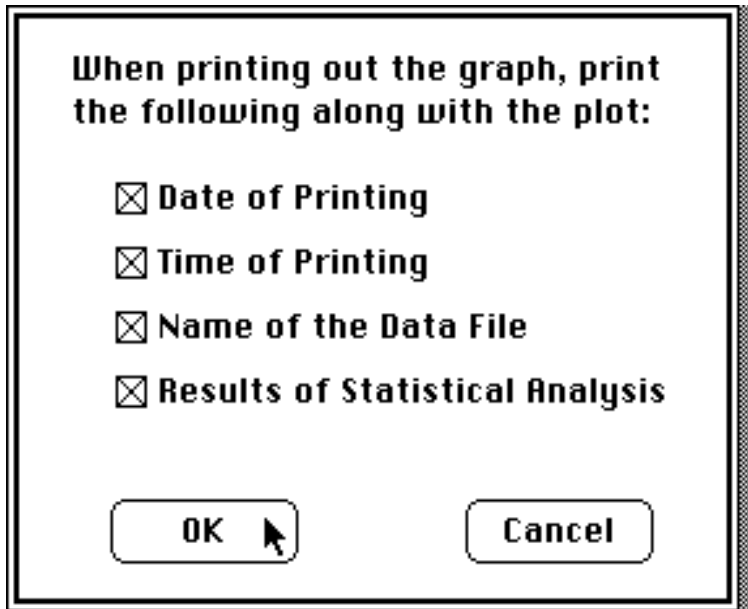


Note that you can switch an option on and off by repeatedly clicking in it. When there's an X in the box, it's switched on, when the box is empty, it's off.

Try switching on "Connect Points", then click "OK".

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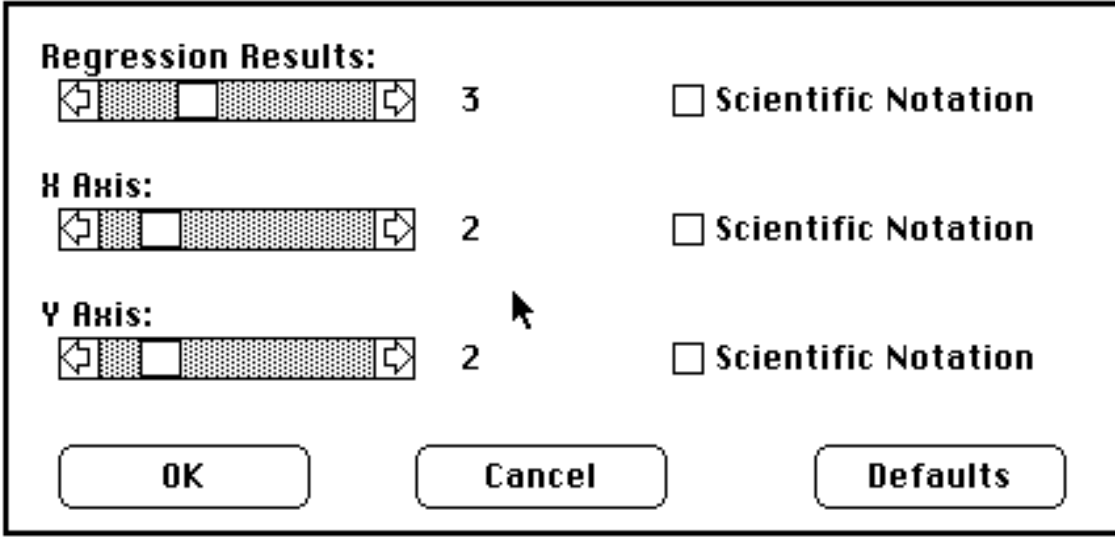
• "Plot Information" allows you to add some information to the printed output that isn't displayed on the screen with the plot. Initially, the switches are set so that the date, time, name of the datafile, and statistical information are all printed out with the plot. The box to change the settings looks like this:



As in the Plot Type box, click in a box to change its setting.

• "Number Formats" gives you finer control over the displayed precision of the tick mark labels, and of the statistics results. You can use the scroll bars to set the number of places you wish to display; if you set the check box labeled "Scientific Notation" next to a scroll bar, that scroll bar's setting will be ignored, and the tick mark labels (or statistics) will be displayed in a fixed-point notation: two significant figures, plus a power-of-ten exponent. Note that the tick labels will be displayed as integers unless the "Label Ticks with Integral Values Only" check boxes are not set in the Graph Formats dialog box (see the next paragraph). The Number Formats box looks like this:

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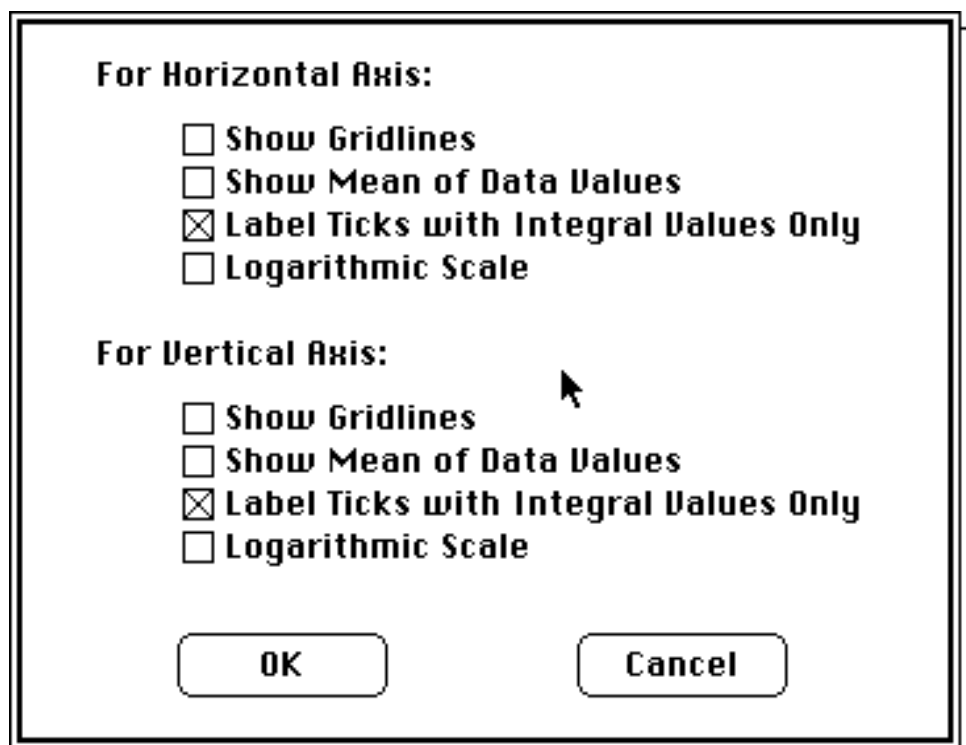
The image shows a dialog box titled "Regression Results:". It contains three rows of settings. The first row is for "Regression Results:", showing a spinner box set to 3 and an unchecked checkbox for "Scientific Notation". The second row is for "X Axis:", showing a spinner box set to 2 and an unchecked checkbox for "Scientific Notation". The third row is for "Y Axis:", showing a spinner box set to 2 and an unchecked checkbox for "Scientific Notation". A mouse cursor is pointing at the "Y Axis:" spinner box. At the bottom of the dialog are three buttons: "OK", "Cancel", and "Defaults".

Section	Value	Scientific Notation
Regression Results:	3	<input type="checkbox"/>
X Axis:	2	<input type="checkbox"/>
Y Axis:	2	<input type="checkbox"/>

Buttons: OK, Cancel, Defaults

If you click in the button labeled "Defaults", the settings will be set to 3 places for the regression results, and to 2 decimal places for the axes.

• "Graph Formats" lets you add some features to your graph. The check boxes are set in the fashion previously described. If part of your dataset is not suitable for plotting on a log-scaled axis, the check box corresponding to that axis will be disabled and turned gray. An additional note: if the check box labeled "Label Ticks with Integral Values Only" are set, then only tick marks whose values would be integers will have labels, and all other ticks will not have a label. For example, if a tick mark has a label value of 15.9, then if the "Label Ticks with Integral Values Only" switch for that axis is set, the tick mark will not have a label. However, if the tick mark has a label value of 16.0, then it will be labeled with "16". Try changing this setting to see the effect. This is the dialog box:



For Horizontal Axis:

- ☐ Show Gridlines
- ☐ Show Mean of Data Values
- ☒ Label Ticks with Integral Values Only
- ☐ Logarithmic Scale

For Vertical Axis:

- ☐ Show Gridlines
- ☐ Show Mean of Data Values
- ☒ Label Ticks with Integral Values Only
- ☐ Logarithmic Scale

OK Cancel

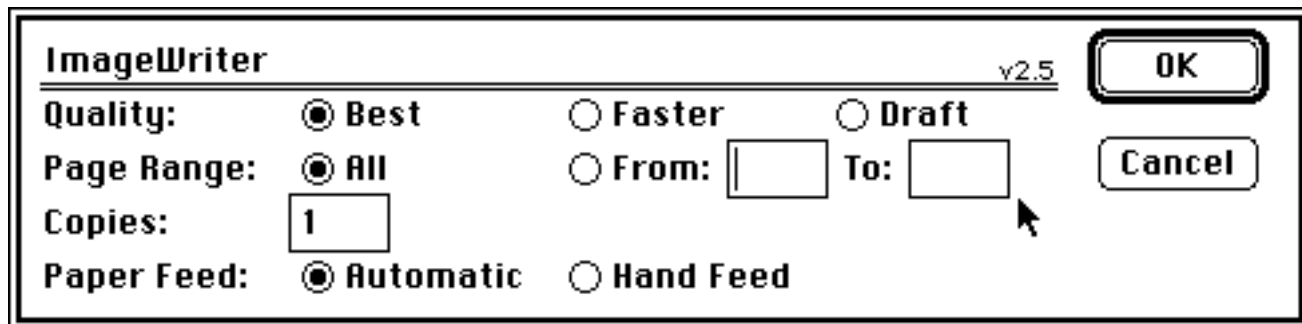
These 6 dialog boxes allow you to format your plot. The next step is to print the plot out. There are two steps to doing this. First, choose "Page Setup" from the "File" menu:

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This dialog box is for the ImageWriter printer; the box for the LaserWriter is different. The essentials are the same: settings for paper size, special effects and orientation. When you're printing out a plot, it's recommended that you set the orientation to the "Landscape" (sideways) setting. On the Page Setup box above, the setting is for "Portrait" (upright) orientation; click on the icon next to the highlighted icon to set the Landscape setting. If the orientation is set for Landscape, the printout will be closer in scale to the Macintosh screen; plots printed out with Portrait orientation will be stretched vertically. An additional tip: do not change the reduction settings, no matter what printer you choose. If you want to reduce the printed size of you plot, copy the graph and paste it into MacDraw, and scale it there. See "Copying the Graph", page 15, for more details...

The next step in the process is to print out the graph. Simply choose "Print..." from the "File" menu. A dialog like this one will be displayed:



Set the settings to your taste; if you want multiple copies, change the value in the "Copies:" text box. The "Page Range" settings should be left alone; their value has no effect on what comes out of the printer. Click "OK" to start the printing process. A message will be displayed while the printing is in progress, and the cursor will spin briefly while the graph is drawn on the printer. At any time during this process you can cancel the printing process by holding the Command key (just to the left of the space bar) and typing a Period (.) .

Copying The Graph

FzzPlot has the ability to copy any graph on the screen to the Clipboard. This ability is quite useful; for example, you might want to include a graph in a report or presentation document. Or, you may wish to copy a graph to MacDraw to put the axis labels into a different font, and perhaps rotate the vertical axis label, since FzzPlot doesn't know how to rotate text or do multiple fonts (yet).

The copying process is quite simple. First, create and format your graph as described on the previous pages. Then choose "Copy Graph" from the **Edit** menu, and your graph is copied to the Clipboard. That's it! There are some things to take note of:

- FzzPlot copies your graph to the Clipboard in the exact size that it's displayed on the Macintosh screen; this means that if you copy a plot window that is 3 inches on a side, and paste the graph into MacDraw, the graph you paste will be only 3 inches on a side. Conversely, a plot window that fills a large screen such as the Radius FPD™, which measures 8^{1/2} x 11 inches, will, when pasted into MacDraw, measure 8^{1/2} x 11 inches.

- Graphs are copied to the Clipboard as "pictures"; this means that you can resize a graph once it's been pasted, and it will still be printed out smoothly on a LaserWriter (or other high-resolution printer) with no loss of detail. The drawback of this scheme is that very large graphs (more than 2000 points) can take up large amounts of memory while in the Clipboard, and MacDraw will take a long time to redraw a graph once you've pasted it.

IV. Conclusion

And that's all there is to it! FzzPlot has many more capabilities, and you can learn about those capabilities by consulting the FzzPlot Reference, which gives a detailed description of all of FzzPlot's features, as well as some useful technical tips. You can (and should) experiment with the various switches and options. You can't break anything, and you can't damage your data in any way by experimenting.

After experimenting with FzzPlot for a while, you've probably come across a feature of FzzPlot (or part of the documentation) that confuses you, or is inconsistent, or just plain irritating. My main gripe is that the vertical axis label is not rotated or positioned correctly; fortunately, that can be remedied by copying the graph, pasting it into MacPaint or MacDraw, selecting the axis label, and rotating it. Future versions of FzzPlot will fix this problem.

If you have other problems, don't hesitate to write. I value user feedback, good or bad.

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FzzPlot uses standard Pascal libraries and intrinsics supplied with the Lightspeed™ Pascal development environment; these libraries and intrinsics are copyright ©1986 by THINK Technologies, Inc; 420 Bedford St, Lexington, Mass. 02173

It's not a bug, it's a feature!