Xmaxima Manual

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Xmaxima is a graphical interface for *Maxima*, written in *Tcl/Tk*. It also provides the *openmath* plotting program for Maxima, which can do some of the plots done by Maxima's default plotter (*gnuplot*) and a few more that gnuplot cannot do.

This manual was written for version 5.11.0 of Xmaxima. Some familiarity with Maxima 5.11.0 is assumed. There is a separate reference manual for Maxima, which can be browsed and studied from Xmaxima.

1 Command-line options

The executable program, xmaxima, accepts the following command-line options:

`-help`
`-h` Displays a brief usage summary.

`-url site` Start Xmaxima's browser with the page at the URL '`site`'

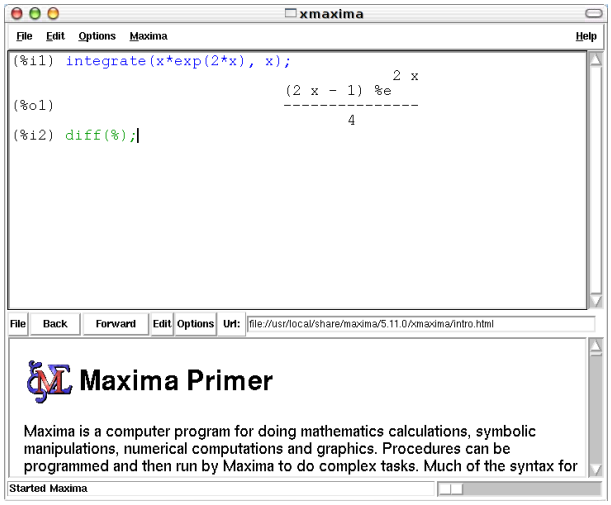
`-use-version ver`
`-u ver` Launch version '`ver`' of Maxima.

`-lisp flavor`
`-l flavor` Use the lisp implementation '`flavor`' of Maxima.

2 Xmaxima Window

By default, Xmaxima creates a window split horizontally into two sub-windows. The one on the top is the text window, where all the commands for Maxima will be entered and the output returned by Maxima will be printed.

The lower window is Xmaxima's browser; it is used to show a quick primer, a copy of the Maxima manual and any other HTML you might want to download from the Web.



The cursor is the small vertical bar that blinks in the text Window. The text that is currently being written in the text window and which could be submitted to Maxima for evaluation is rendered in green. The text sent back by Maxima is rendered in black, and the text that has been previously entered by the user and that was already evaluated by Maxima is rendered in blue.

The relative size of the two sub-windows can be adjusted, by dragging the horizontal bar that separates them, with the mouse. The browser window can be eliminated, leaving only a larger text window, and recovered again, by using the section '`Toggle Browser Visibility`' in the `Options` menu.

You can also choose different types and sizes for the fonts, in the section '`Preferences`' of the `Options` menu; those settings will be saved for future sessions.

3 Entering commands

Most commonly, you will enter Maxima commands in the last input line that appears on the text Window. That text will be rendered in green. If you press enter, without having written a command-termination character (either '`;`' or '`$`') at the end, the text will remain green and you can continue to write a multi-line command. When you type a command-end character and press the enter key, the text will become blue and a response from Maxima should appear in black. You can also use the key combination *`Ctrl-j`* to move to a new line without sending the input for Maxima evaluation yet. If you want to clear all the current input (in green), even if it spans several lines, use the key combination *`Ctrl-u`*.

If you move the cursor over the `(%i1)` input label, or any other label or output text (in black), you will not be able to type any text there; that feature will prevent you from trying to enter a command in the wrong place, by mistake. If you really want to insert some additional text to modify Maxima's output, and which will not be interpreted by Maxima, you can do that using cut and paste (we will cover that later).

You can also write a new input command for Maxima on top of a previous input line (in blue), for instance, if you do not want to write down again everything but just want to make a slight change. Once you press the enter key, the text you modified will appear at the last input line, as if you had written it down there; the input line you modified will continue the same in Xmaxima's and Maxima's memory, in spite of having changed in the screen.

For example, suppose you entered '`a: 45;`' in input line `(%i1)`, and something else in `(%i2)`. You then move up over the `(%i1) a: 45;` and change the 5 for an 8. Once you press enter, you will have in the screen `(%i1) a: 48;` and `(%i3) a: 48;`. But if you write, in the current input line, `(%i1)` the original input '`a: 45;`' will reappear. If you navigate through the input lines history (see next section), you will also see that the first input keeps its original value.

3.1 Input lines history

When the cursor is at the end of the last `(%i)` label, you can use the key combinations *`Alt-p`* and *`Alt-n`* to recover the previous or next command that you entered. If you have just pressed *`Alt-n`*, the '`next`' command means the first one you entered; but if you press it again it will mean the second one and so on.

In the same way, if you press *`Alt-p`* repeatedly, until you reached the first input, it will then continue to the last command you entered. Once you get on the screen the command that you were looking for, it will appear in green, as if you would have just type it, and you can modify it before you press enter.

Those two key combinations can also be used to search for a previous input line with a particular string in it. You first write down the string to search, and then press *`Alt-p`*, to search backwards, or *`Alt-n`* to search forward. Pressing those key combinations repeatedly will allow you to cycle through all the lines that contain the string. If you want to try a different string in the middle of the search, you can delete the current input, type the new string, and start the search again.

3.2 Cutting and pasting

You can cut or copy a piece of text that you select, from anywhere on text window; not just from the input lines but also from the output text in black.

To select the text, you can drag the cursor with the mouse while you keep its left button depressed, or you can hold the *shift* key with one finger, while you move the cursor with the mouse or with the arrow keys.

Once you have selected the text, you can either cut it, with *Ctrl-x*, or copy it to an internal buffer, with *Ctrl-c*. Instead of those key combinations, you can also use two options that appear inside the `Edit` menu.

The text that has been cut or copied more recently can be pasted anywhere, even in the output fields, using *Ctrl-v* or an option in the `Edit` menu.

There is a command similar to '`cut`', called '`kill`' (*Ctrl-k*, with two major differences: it only works in input fields (blue or green) and instead of cutting a text that was selected, it will cut all the text from the cursor until the end of the input line where the cursor is. The command '`Clear input`' (*Ctrl-u*) is similar to '`kill`', but it will cut the whole input line.

To paste the last text that you have cut with either '`kill`' or '`clear input`', you should use the '`yank`' command, *Ctrl-y*. If you prefer, you can use entries in the `Edit` menu to kill, clear input and yank.

3.3 Other key combinations

There are other useful key combinations, which are not particular to Xmaxima, but are defined in most Tcl/Tk programs:

Ctrl-f	The same as the right arrow key.
Ctrl-b	The same as the left arrow key.
Ctrl-p	The same as the up arrow key.
Ctrl-n	The same as the down arrow key.
Ctrl-a	Moves to the first character in a line (either input or output)
Ctrl-e	Moves to the last character in a line (either input or output)
PageUp	Moves one page up
PageDown	Moves one page down
Home	Moves the first character in the text window.
End	Moves to the last character in the text window.

4 Session control

The `File` menu has sections to manage the work session in Xmaxima. The '`Batch file`' and '`Batch file silently`' sections are equivalent to Maxima's commands `batch` and `batchload`, which can also be used in Xmaxima. The advantage of those two options is that they will open a dialog box that will allow you to navigate through your directories, until you find the one that you are looking for.

The '`Restore Maxima State`' (*`Alt-i`*) section allows you to reload the state of a Maxima session that you saved using the '`Save Maxima State to File`' section. The latter saves the state as a Lisp file using Maxima's `save` command.

The '`Save Maxima Input to File`' (*`Ctrl-a`*) section saves each input line as Maxima code using the Maxima `stringout` command. This code can be manually edited in a text editor and loaded into Xmaxima using '`Batch file`'.

In the menu `Edit` there is also an option '`Save console to file`' which will save the complete contents of the text window into a file. The input and output will be saved as they look on the screen, and not as they were originally written.

The option '`Input prompt`' (*`Alt-s`*) will repeat the last input label sent back by Maxima. That will be useful if you are working on a text that is not near the last input label and you want to move quickly to the last input.

Option '`Interrupt`' (*`Alt-g`*) can be used to interrupt a calculation. And the option '`Restart`' will end the current execution of Maxima; a new Maxima process will be invoked, so the input prompt will start again as `(%i1)`.

5 Openmath plots

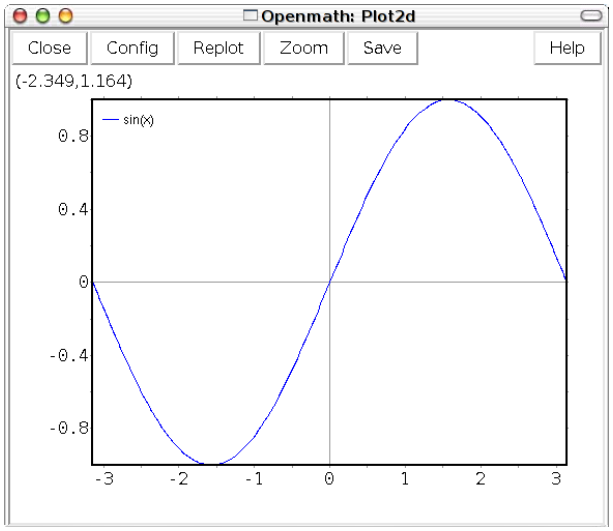
Openmath can be used either directly or from Maxima, to plot 2d and 3d graphs. From Maxima, it will be used by the functions `plot2d` and `plot3d`, if the option `[plot_format, openmath]` is used. There are other plotting functions in Maxima that will only work in openmath: `plotdf`, `openplot_curves` and `graph2d`. All those plotting functions are documented in the Maxima Reference Manual.

A command used to create a 2d openmath plot, for example:

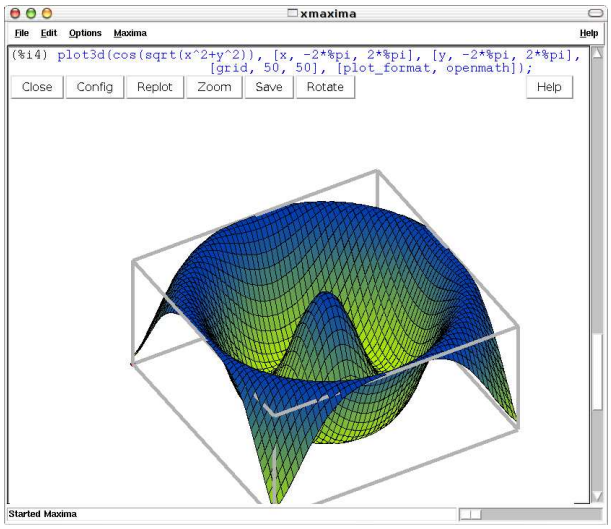
```
plot2d(sin(x), [x, -%pi, %pi], [plot_format, openmath]);
```

creates a window with a menu bar with the following options:

- *Close*. Destroys the plot window and sends the control back to Maxima.
- *Config*. Allows you to change some configurations of the plot.
- *Replot*. After configuration changes are made, this menu option should be selected, to activate the new settings.
- *Zoom*. Will change the behavior of the mouse so that it will allow you to zoom in on a region of the plot by clicking with the left button. Each click near a point magnifies the plot, keeping the center at the point where you clicked. Holding the ***Shift*** key while clicking, zooms out to the previous magnification.
- *Dragging*. Holding the right mouse button down while the cursor is moved, the plot can be moved sideways or up and down.
- *Save*. Can be used to save a copy of the plot in a Postscript file.
- *Help*. Will show a short summary of the plot window options.



By default, each plot will be opened in a new separate window. However, the plot windows can be embedded into Xmaxima's text window, by selecting the option '`Plot windows -> Embedded`' in the `Options` menu, before the plot command is issued.



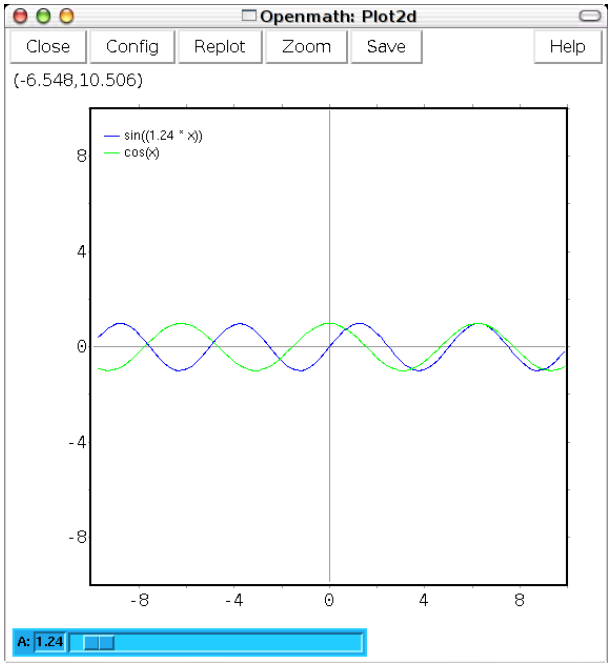
The 3d plot has a menu very similar to that obtained with `plot2d`, but with one additional option: *Rotate*. Normally, if you click on the plot, it will not be enlarged, as the 2d plots. Clicking on the left button, while dragging the mouse, will rotate the plot, allowing to control two angles: azimuth and elevation.

The menu option '`Zoom`', will change that default behavior, making the mouse enlarge the plot, as in the 2d case. To return to the default behavior (the mouse makes the plot rotate), the Rotate button should be used.

If Xmaxima is executed from the command line, giving as argument the name of a file, it will open that file and interpret it as a plot command, with a syntax specific of openmath. The graph generated by the commands in the file will be plotted in a plot window, and the main window of Xmaxima will not be opened and no communication with Maxima will be established. An example of the contents of a file that can be passed directly to Xmaxima is the following:

```
plot2d -xfun "sin(A*x);cos(x)" -yradius 10
       -sliders {A=1:6} -parameters {A=1}
```

that file will generate a plot of a cosine function with fixed period, and a sine function with a period that can be changed by moving the slider that appears on the bottom.



the sliders option of openmath is one feature that cannot be accessed directly from `plot2d` in Maxima. Other examples of input files for openmath are the files `maxout.openmath` that Maxima creates; when Maxima is run from the command line, and a plotting function that involves openmath is used, the data is not passed directly to Xmaxima, but it is rather saved into that file and then xmaxima is executed with the name of that file as argument.

The strings used in those files must be properly represented as Tcl/Tk strings.

6 The browser

Xmaxima's browser is a Web browser. It lacks many features available in any modern browser, such as style-sheets and tables support. On the other hand, that browser accepts two additional tags, which are not part of HTML, but are very useful to pass commands to Xmaxima from the html page.

One example of that is the Maxima Primer that appears in the browser when Xmaxima starts. That primer has some fields where you can click to get the result inside the browser window. The syntax of the two additional tags is as follows

```
<eval program=maxima doinsert=0>maxima_command</eval>
<eval program=maxima doinsert=1>command</eval>
<result modified>result</result>
```

The first form will highlight the given Maxima command, and when the user double clicks on it, it will be evaluated, but its result will not be inserted back into the original web page.

The second form will act similarly to the first, but the result from Maxima will now be inserted back into the Web page, in the next tag '`result`' that appears in the page. The commands shown in the `eval` tags can be edited and reenter.

Some more sample active pages can be found in `http://www.ma.utexas.edu/users/wfs/netmath/netmath.html`

7 Getting Help

Xmaxima can be used to access Maxima's documentation in several different forms. The `describe` of Maxima should work exactly as it does in Maxima. The `Help` menu has a link to the local copy of the manual, which is distributed with Maxima. In that menu there is also a link to the Website of Maxima, where some other documentation can be found.

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