

Including Graphics in L^AT_EX Files

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1 Purpose

This short manual discusses one way to include screen shots, Maple graphics, and “hand-drawn” graphics into a L^AT_EX document. In order have Maple graphics to appear with L^AT_EX fonts, it is necessary to use `psfrag`, as discussed below.

The documents that result from these methods can either be printed, or, using `dvi2pdf`, turned into PDF documents viewable using Acrobat Reader. Graphics inclusion in slides and web-pages is discussed elsewhere.

1.1 ScreenShots using gimp

1.1.1 Prerequisites

`gimp` is a graphic tool which has many features and can be obtained at <http://www.gimp.org>.

1.1.2 Preamble

In order to include the PostScript files generated by `gimp`, it is necessary to have

```
\usepackage{graphicx}
```

in the preamble of the L^AT_EX document.

1.1.3 Example

Use `gimp` to capture screens as follows:

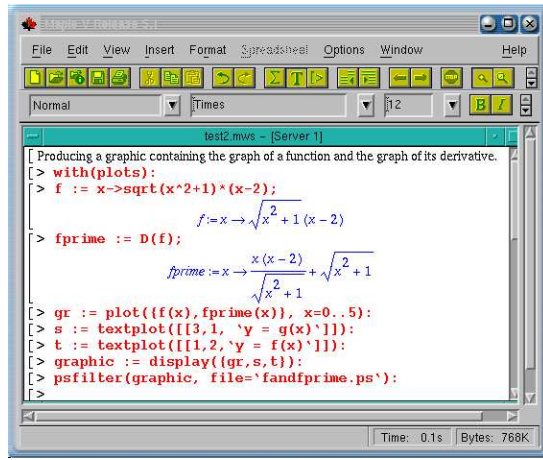
Generate the desired window and start `gimp`. Ultimately, the following window will appear



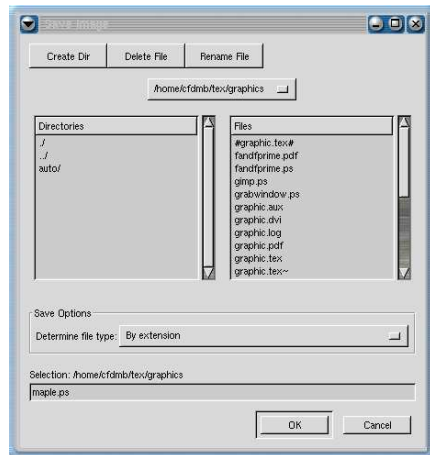
Under the pulldown menu for Xtns make the choice **Screen Shot**. The Screen Shot window appears



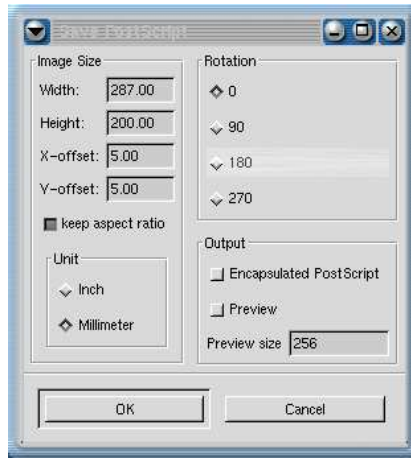
Be sure the options are set to **Grab a single window** and that the window you wish to grab is completely visible. Left click on **grab**. You have about a second to move to the desired window and left click.



A sound occurs indicating the selection has been made. Soon another copy of the chosen window appears. If you wish to crop the image, you can use the crop tool of gimp. Once the image is as desired, right click somewhere on the window to get the **File/SaveAs** option. After the mouse button is released, the following window appears.



Enter the appropriate filename with a .ps suffix and click on OK. A final window allows for some final adjustment. Be sure that **Rotation** is set to zero in this window



Press **OK** to conclude the process.

Lines similar to

```
\begin{center}
  \includegraphics[scale=0.3]{maple}
\end{center}
```

must appear in the document at the place the graphic is to be included. (No file suffix is needed. The `scale` option scales down the graphic.)

1.2 Maple graphics

1.2.1 Prerequisites

The most recent version of Maple and `psfilter`, written by Bill Slough, are needed.

1.2.2 Preamble

In order to include PostScript files generated by Maple, it is necessary to have

```
\usepackage{graphicx}
```

in the preamble of the \LaTeX document.

1.2.3 Example

Activate Maple and generate the desired graphic. In this case, we want a graph of

$$f(x) = (x + 2)\sqrt{x^2 + 1}$$

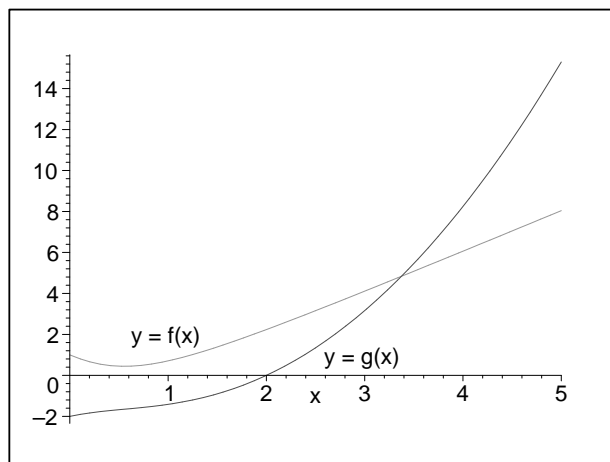
and its derivative.

In the following example, a variable `gr` is defined to hold the plot structure. Variables `s` and `t` are used to hold text plots located on the graph at (3,1) and (1,2), respectively. Using the `display` command from the `plots` package a variable `graphic` is created which stores the graphic to be displayed. Finally, `psfilter` (written by Bill Slough) is used to place the graphic in a file, `fandfprime.ps`.

The Maple session for this example is

```
test2.mws - [Server 1]
[Producing a graphic containing the graph of a function and the graph of its derivative.
[> with(plots):
[> f := x->sqrt(x^2+1)*(x-2);
      f := x -> sqrt(x^2 + 1)(x - 2)
[> fprime := D(f);
      fprime := x -> x(x - 2) / sqrt(x^2 + 1) + sqrt(x^2 + 1)
[> gr := plot({f(x), fprime(x)}, x=0..5):
[> s := textplot([[3,1, 'y = g(x)']]):
[> t := textplot([[1,2, 'y = f(x)']]):
[> graphic := display({gr,s,t}):
[> psfilter(graphic, file='fandfprime.ps'):
[>
```

The result of this session is



If no border is desired, there is an option in `psfilter` which would do this. In this example, no border would be produced if the `psfilter` command was

```
psfilter(graphic, file='fandfprime.ps', noborder);
```

A line similar to

```
\begin{center}
  \includegraphics[scale=0.8]{fandfprime}
\end{center}
```

must appear in the document at the location where the graphic is to be included.

1.3 Using psfrag for font substitution

1.3.1 Preamble

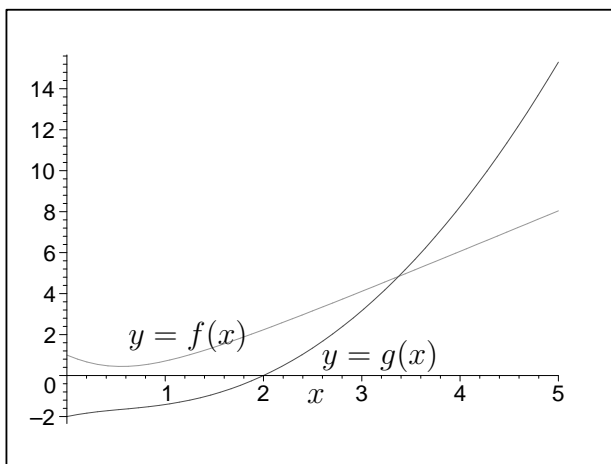
The line

```
\usepackage{psfrag}
```

must appear in the preamble to use this font substitution package.

1.3.2 Example

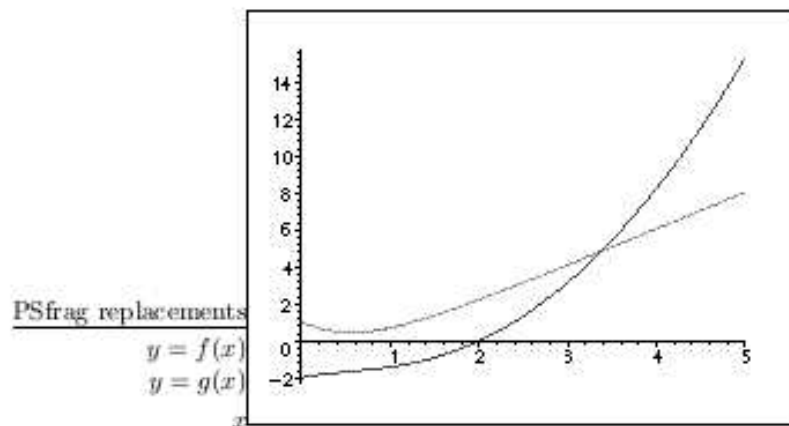
In the preceding example, the characters $y = f(x)$ and $y = g(x)$ and x are not in \LaTeX fonts. `psfrag` can be used to make this substitutions to get the following graphic.



Lines similar to

```
\psfrag{y = f(x)}{ $y=f(x)$ }
\psfrag{y = g(x)}{ $y=g(x)$ }
\psfrag{x}{ $x$ }
```

must appear before the `includegraphics` command to give the substitutions that `psfrag` is to perform. These substitutions do not appear upon viewing, but do appear upon printing. In this case, the viewer shows



while the printed version shows the previous graph.

1.4 User-created graphics using xfig

1.4.1 Introduction

By using the `xfig` drawing program, one can draw a figures which can be exported in a variety of formats. For slides, it appears the PNG format is the best. Two methods for inclusion in print document, `Combined PS/LaTeX` and `Encapsulated Postscript` are discussed.

1.4.2 Prerequisites

The most recent version of `xfig` is in `local-installations` on `facshare`. Instructions for installing it are in `doc`).

1.4.3 Preamble

The necessary preamble varies with the inclusion method.

1.4.4 Encapsulated PostScript






Encapsulated Postscript is the easiest to use if you only want to use \TeX character fonts in the graphic. If you need mathematical symbols, you must use the combined form.

In the preamble, the line

```
\usepackage{graphicx}
```

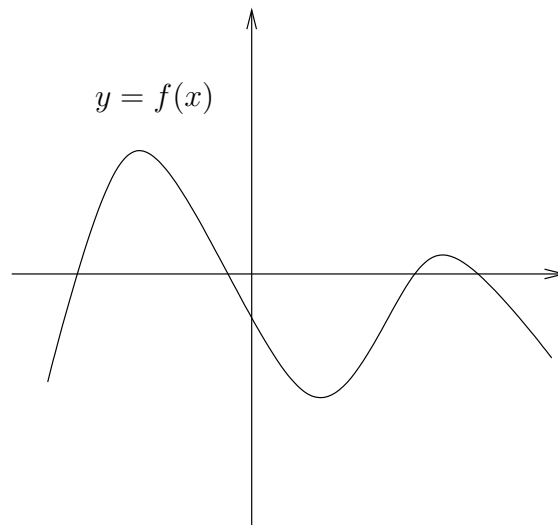
must be included.

The following steps are necessary to produce the example below.

- Select the polyline drawing tool . Place the cursor at start of each axis, depress the left mouse button, move to the end, and release the button. To fix the line, press the middle mouse button.
- Select the arrow tool  and place arrows on the ends of the axis.
- Select the approximated spline drawing tool  and determine the control points for the curve.
- Select the move points drawing tool  and move points appropriately.
- To enter the fonts, select the TextFont from the lower right and use \TeX italic fonts.
- Select the text tool  and enter the text.
- Select Save and save the file in fig format for later editing.

- Select Export and export the file in Encapsulated Postscript format for inclusion in the \LaTeX file.

An example of a drawing produced in this manner is:



In order to include this drawing, lines similar to

```
\begin{center}
\includegraphics{function.eps}
\end{center}
```

must appear in the file

1.4.5 Combined PS/ \LaTeX format

This form is necessary if you need mathematical symbols in the drawing.


In the preamble, the lines

```
\usepackage{epsfig}
\usepackage{graphicx}
```


must be included.

Proceed as above, until you begin to enter the text.



- Select the text tool  and enter text, using \LaTeX syntax.



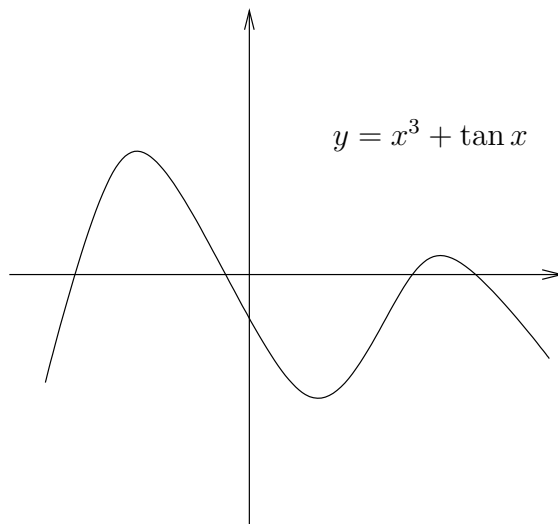
- Select the edit tool  and then select the desired text. Make sure that the special flag is set as follows



in order for the text to be properly displayed. Do not forget to click Apply to effect the change.

- Select File and save the graph as a .fig graphic for later editing.
- Select Export and export the document in Combined PS/Latex format. This produces two files - one containing the graphics and one for the text.

The following is a graph produced in this manner.



The lines,

```
\begin{center}
\input{function2.pstex_t}
\end{center}
```

must be included in the text. The .pstex_t contains text information and also causes a PostScript file to be included.

1.5 PDF documents

The dvi documents produced by the methods outlined above can be turned into PDF documents with `dvi2pdf` and viewed using Acrobat Reader. For example, to process a file with \TeX , convert it, and then view it, the commands would be

```
latex graphic
dvi2pdf graphic
acroread graphic.pdf
```

To have pull-down menu choices for the various packages for foils, web-pages, and PDF documents, you might add the following lines to `~/elisp/tex-site.el`

```
(list "Dvi2Pdf" "dvi2pdf %s" 'TeX-run-shell nil t)
(list "LaTeX4ht Interactive" "ht latex %s" 'TeX-run-interactive nil t)
(list "PdfLaTeX Interactive" "pdflatex %s" 'TeX-run-interactive nil t)
(list "PP4" "pp4 %s.pdf" 'TeX-run-shell nil t)
(list "Acrobat Reader" "acroread %s.pdf" 'TeX-run-interactive nil t)
;; Not part of standard TeX.
```

2 Bibliography

Further information can be found in

1. The `xfig` help file.
2. Michael Goossens, Sebastian Rahtz, and Frank Mittlebach, *The \TeX Graphics Companion*, Addison-Wesley, 1997.