

Gnuplot tutorial

Gnuplot is convenient software to plot built-in functions and any other external data. It can also plot three dimensional data.

- ① Go to terminal.
- ② Type `gnuplot` to start up; however, if it is not installed, follow the instruction. Namely, type `like` and type `q` or `quit` to terminate the program.

1. The built-in functions

Command in gnuplot	Mathematical functions
<code>abs(x)</code>	$ x $
<code>sin(x)</code>	$\sin x$
<code>cos(x)</code>	$\cos x$
<code>tan(x)</code>	$\tan x$
<code>asin(x)</code>	$\arcsin x$
<code>acos(x)</code>	$\arccos x$
<code>atan(x)</code>	$\arctan x$
<code>sinh(x)</code>	$\sinh x$
<code>cosh(x)</code>	$\cosh x$
<code>tanh(x)</code>	$\tanh x$
<code>exp(x)</code>	$\exp x$
<code>log(x)</code>	$\log x$
<code>log10(x)</code>	$\log_{10} x$
<code>sqrt(x)</code>	\sqrt{x}
<code>x**2</code>	x^2
<code>x*y</code>	xy

The other functions are also supported, such as Bessel, error functions, etc. Many functions can take complex numbers.

2. Plot functions and data

- Plot a built-in function in x-y plane.

```
gnuplot> plot sin(x)
```

Try one of the above functions!

- Plot a 3D function.

```
gnuplot> splot sin(x)*y
```

Create any 3D function to plot!

- Plot a set of data in a file. (Use quotation for the filename. If necessary, use `splot`.)

```
gnuplot> plot 'file.d'
```

3. Useful commands

○ Plot this function: $\exp(-x*x)+\exp(-y*y)$. Then set the range as follows:

```
gnuplot> set xrange[-2:2]           press enter  
gnuplot> set yrange[-2:2]         press enter  
gnuplot> replot                   press enter
```

○ Other scripts

```
> set title "The title of the plot"  
> set xlabel "Name of x axis"  
> set ylabel "Name of y axis"
```

○ If you want to plot more than one function or data, use commas.

```
> plot sin(x), cos(x)
```

○ If you have more than two-column data and want to plot with only two of them, use the following commands:

```
> plot "datafile" using 1:3         This means plotting with the first and the third columns
```

○ If you want to plot the data with different styles, try the following:

```
> plot "datafile" with line  
> plot "datafile" with dot  
> plot "datafile" with impulse  
> plot "datafile" with point
```

○ You can also combine the above.

```
> plot "datafile1" using 1:2 with line, "datafile2" using 1:3 with impulse
```

4. Save the plot as a picture

There are several ways, but the easiest way is to use GIMP, which is the software in Linux. You may find it in applications.

- ① After plotting it, copy in the clipboard.
- ② Start up GIMP, and open a new file.
- ③ Size the frame properly so you can have the entire plot.
- ④ Paste the plot, and save as JPEG, BMP, or any picture-file format.