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, you will follow the instruction as "apt-get install gnuplot." Namely, type "q" or "quit" to terminate the program.

1. The built-in functions

Command in gnuplot	Mathematical expressions
abs(x)	$\lvert x \rvert$
sin(x)	$\sin x$
cos(x)	$\cos x$
tan(x)	$\tan x$
asin(x)	$\arcsin x$
acos(x)	$\arccos x$
atan(x)	$\arctan x$
sinh(x)	$\sinh x$
cosh(x)	$\cosh x$
tanh(x)	$\tanh x$
exp(x)	$\exp x$
log(x)	$\ln x$
log10(x)	$\log_{10} x$
sqrt(x)	$\sqrt{x}$
x**2	x^2
x*y	xy

Other functions:

Command	Function
ceil(x)	Return the minimum integer
floor(x)	Return the maximum integer
int(x)	Return the integer of a real value
real(x)	Return the real part of a complex value
imag(x)	Return the imaginary part of a complex value
asinh(x)	Arc hyperbolic sine
acosh(x)	Arc hyperbolic cosine
atanh(x)	Arc hyperbolic tangent
gamma(x)	Gamma function
igamma(x)	Incomplete gamma function
lgamma(x)	Log gamma function
ibeta(x)	Incomplete beta function
besj0(x)	Zero-th order of Bessel J function
besj1(x)	First order of Bessel J function
besy0(x)	Zero-th order of Bessel Y function
besy1(x)	First order of Bessel Y function
rand(x)	Random number b/w 0 and 1

erf(x)	Error function
erfc(x)	Complementary error function: 1 – erf(x)
inverf(x)	Inverse error function
norm(x)	Normal distribution function
invnorm(x)	Inverse normal distribution function

The other functions are also supported, such as Bessel, error functions, etc. Many functions can also 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*
If you want to undo the ranging, type following:
gnuplot> set autoscale

❍ 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. <u>Save the plot as a picture</u>

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.