GNUPlot

A quick user manual

PH1102: Physics Lab I

Why we need a plotting software?

1. To plot a function, visualization and/or output
2. To plot data, visualization and/or output
3. To fit data to a given function, parameter extraction
4. To plot a fitted function along with data, visualization and/or output

Installation of **gnuplot**

The installation files are available at the following URL:
https://sourceforge.net/projects/gnuplot/files/gnuplot/5.4.1/

1. For Linux, use the in build installer and search for “gnuplot”.
2. For Windows, download “.exe” file from above site
3. For Mac OS, download the file with “os2” in it.
4. For Android, go to play store and download/install gnuplot.

Plotting a function

```
gnuplot> plot sin(x)

gnuplot> plot [-2*pi:2*pi] sin(x)

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

gnuplot> f(x) = 3*x - x**3/10 + 10*sin(3*x)

gnuplot> plot [-2*pi:2*pi] f(x),3*x - x**3/10

gnuplot> plot [-2*pi:2*pi] sin(10*x)

gnuplot> set sample 500
```

Output into a file

```
gnuplot> set term png          |   png -> pdf

gnuplot> set out “plot.png”    |   output filename

gnuplot> replot                |   for plotting into the file

gnuplot> set term qt           |   qt -> x11

gnuplot> replot                |   for closing the output file
```

Plotting data file

Assuming a data file named “data.txt” having three columns of data.

```
gnuplot> plot “data.txt” using 1:2 w l, “” using 1:3 w lp

gnuplot> plot “data.txt” u 1:($2*$3) w lp lt 2 ps 0.5

gnuplot> plot “data.txt” u ($1-$2):($2*$3**2) t “my data” w lp lt 3
```

For output, same as earlier.

Data fitting

```
gnuplot> f(x) = a*x + b*x**2 + c*x**3 + d*sin(3*x)
```

Plotting f(x) will give error as the constants (a,b,c,d) are unknown.

```
gnuplot> a=1;b=1;c=1;d=1
```

```
gnuplot> fit f(x) "data.txt" u 1:2 via a,b,c,d
```

Outputs details of the fitting and the parameter values and their correlations.

```
gnuplot> plot "data.txt" u 1:2 w p ps 0.5, f(x) w l lt 3
```

This will give a line plotted through the data points