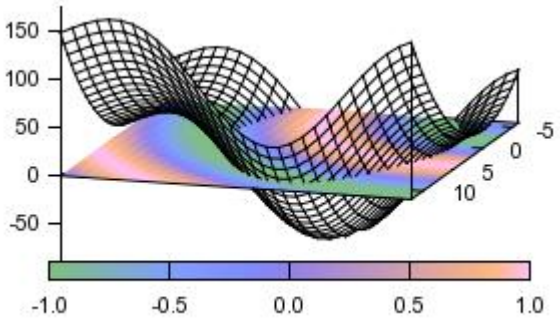
Gnuplot Tutorial

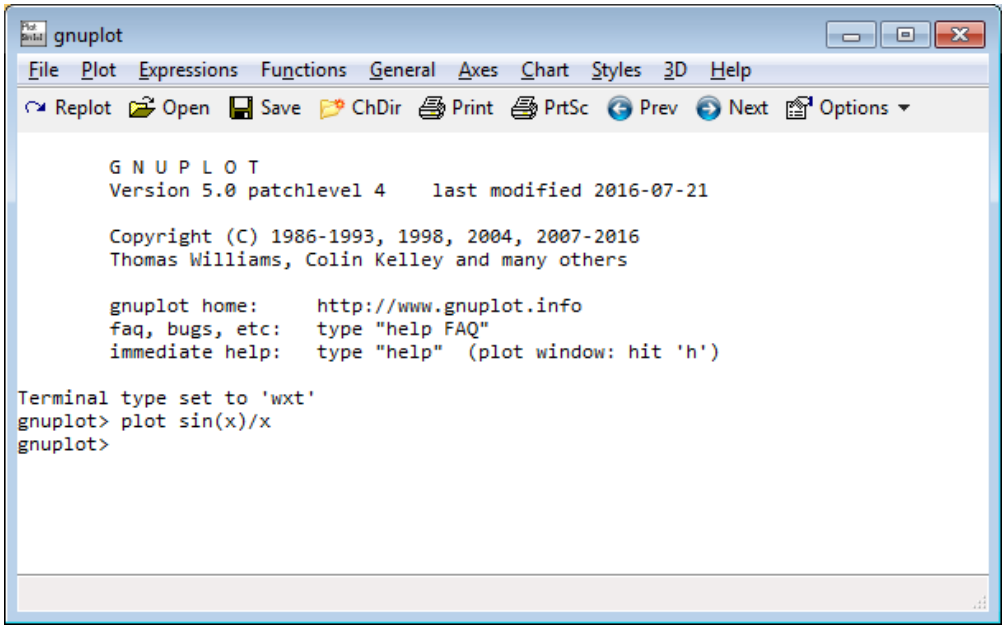
http://www.gnuplot.info
https://www.cs.hmc.edu/~vrable/gnuplot/using-gnuplot.html
http://people.duke.edu/~hpgavin/gnuplot.html

Gnuplot is a portable
command-line driven graphing utility for
- Linux,
- MS Windows
- Mac
- Many other platforms.

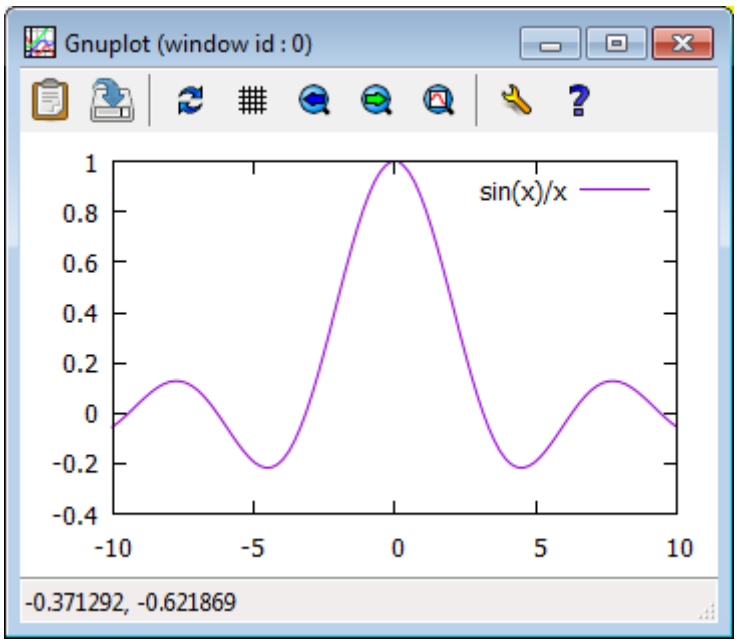
This is a basic tutorial for the Gnuplot (7 pages).
Last modified: 25 Oct 2016

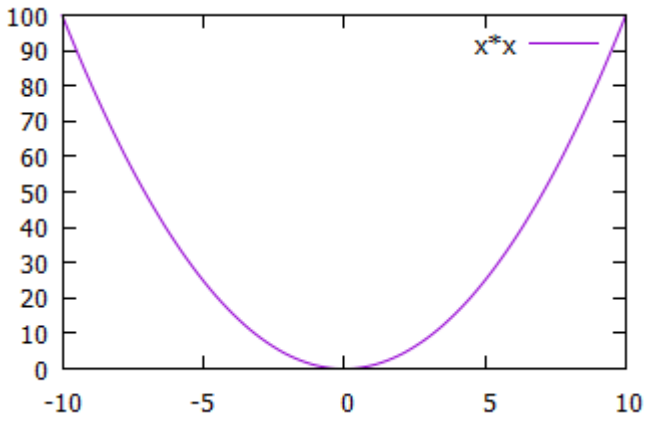
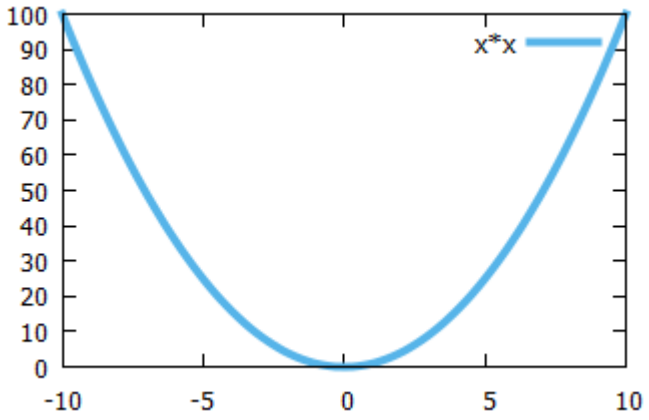
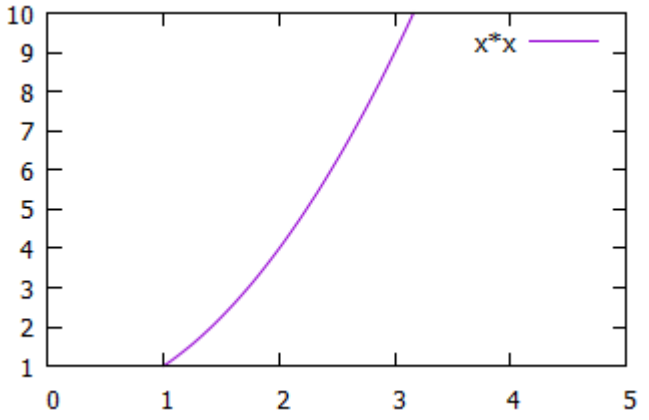
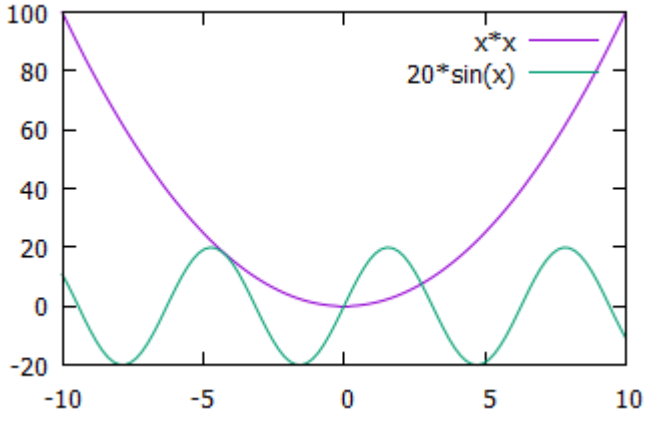


The command line of gnuplot



The screenshoot



GNUPLOT COMMAND	OUTPUT
Plot the $y = f(x) = x^2$ function: **gnuplot> plot x*x**	
Change line color and width: **gnuplot> plot x*x lc 3 lw 4** `lc` stands for line color 1 red, 2 green, 3 blue, etc. `lw` stands for line witdh 1, 2, 3, etc	
Set the function x-range and y-range **gnuplot> plot [0:5] [1:10] x*x** [0:5] set x range from 0 to 5 [1:10] set y range from 1 to 10	
Plot two functions on the same canvas: **gnuplot> plot x*x, 20*sin(x)**	

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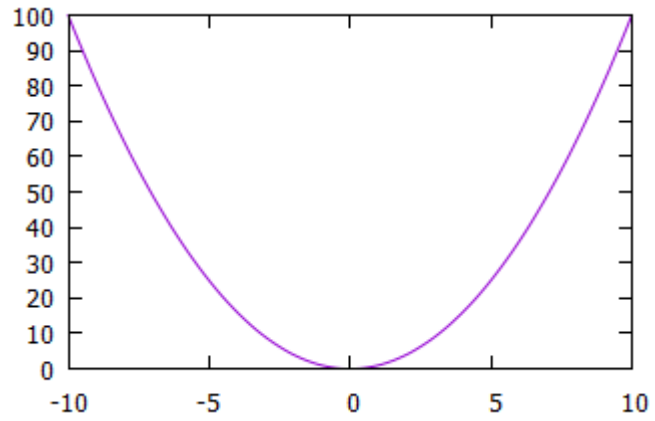
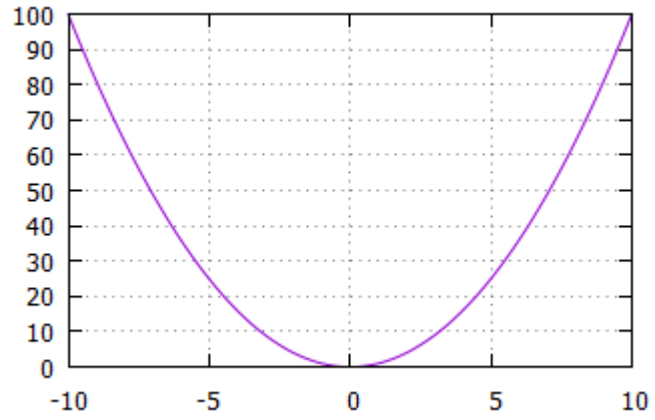
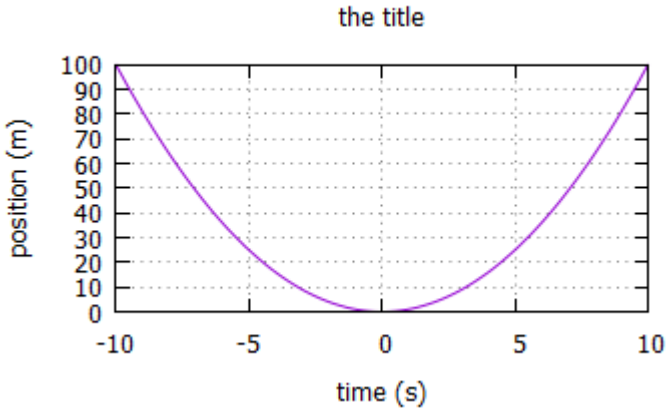
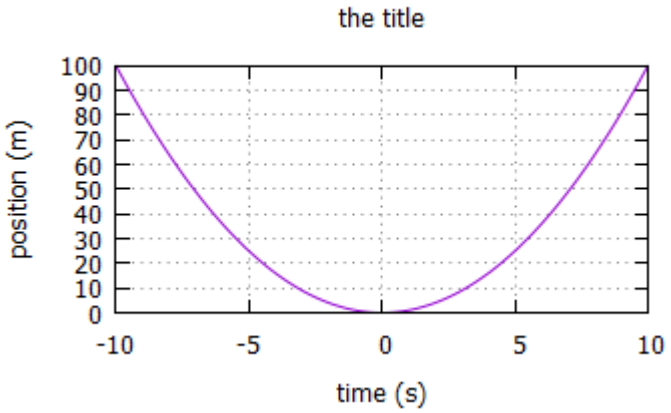
GNUPLOT COMMAND	OUTPUT
Remove key on the right-top of the figure: **gnuplot> unset key** **gnuplot> plot x*x** `set key` : Shows the key on the figure `unset key` : Removes the key on the figure	
Set grid lines: **gnuplot> set grid** **gnuplot> plot x*x** `set grid` : Shows the grid lines `unset grid` : Removes the grid lines	
Set titles: **gnuplot> reset** **gnuplot> set grid** **gnuplot> unset key** **gnuplot> set title 'the title'** **gnuplot> set xlabel 'time (s)'** **gnuplot> set ylabel 'position (m)'** **gnuplot> plot x*x**	

You can save all command in a file called script. You execute the script as follows. Assume that the script file name is myfile.txt. Open myfile.txt on your Desktop folder and type the following lines:
 	
`reset`
`set grid`
`unset key`
`set title 'the title'`
`set xlabel 'time (s)'`
`set ylabel 'position (m)'`
`plot x*x`
 	
In gnuplot command window, change directory or use ChDir button on the tool bar.
 	
gnuplot> cd 'C:\Users\Ahmet\Desktop'
gnuplot> load 'myfile.txt'
	

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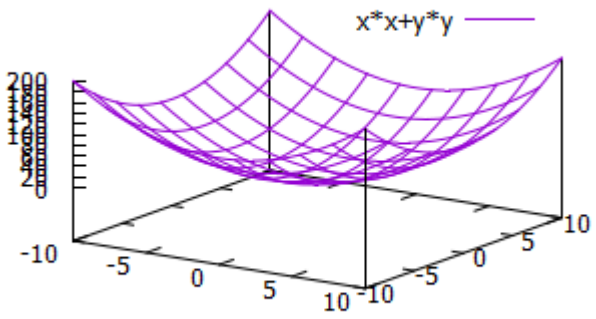
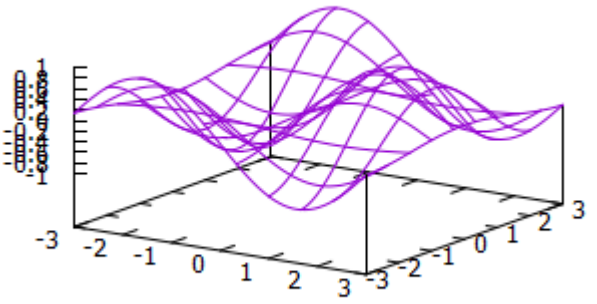
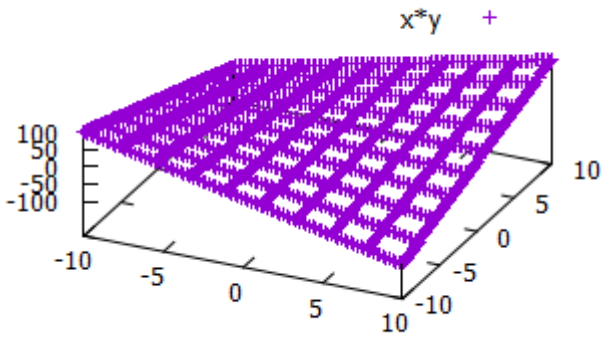
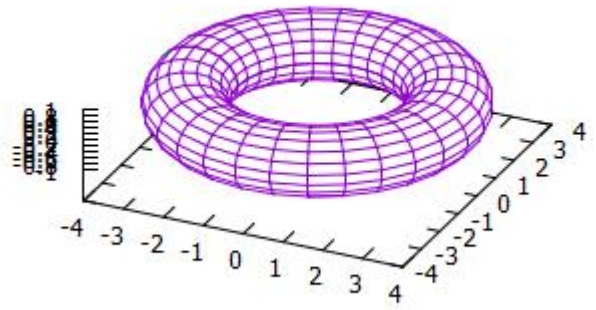
GNUPLOT COMMAND	OUTPUT
Plot the function $y = f(x, y) = x^2 + y^2$ function: **gnuplot>splot x*x+y*y**	
Plot the function $y = f(x, y) = \sin(x)*\cos(y)$ for the given range **gnuplot> unset key** **gnuplot> splot [x=-3:3]** **[y=-3:3] sin(x)*cos(y)**	
Plot the function $y = f(x, y) = xy$ with points **gnuplot> splot x*y with points**	
Plot two functions on the same canvas **gnuplot> set nokey** **gnuplot> set parametric** **gnuplot> set hidden3d** **gnuplot> set view 30** **gnuplot> set isosamples 30,20** **gnuplot> splot [-pi:pi][-pi:pi]** **cos(u)*(cos(v)+3),** **sin(u)*(cos(v)+3),sin(v)**	

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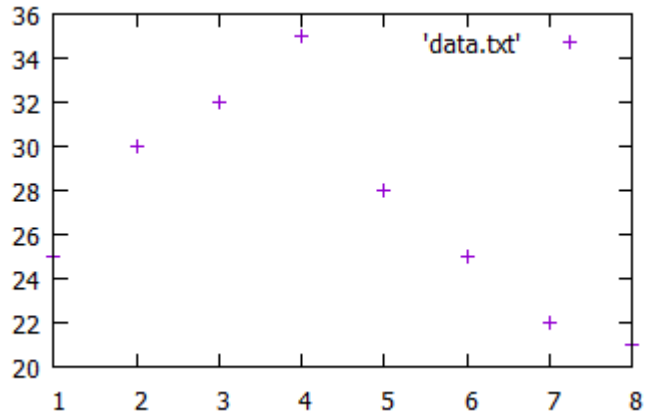
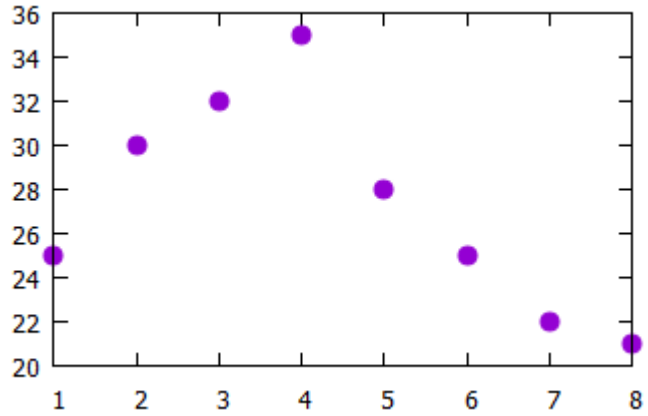
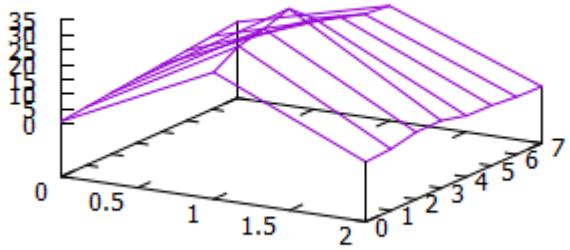
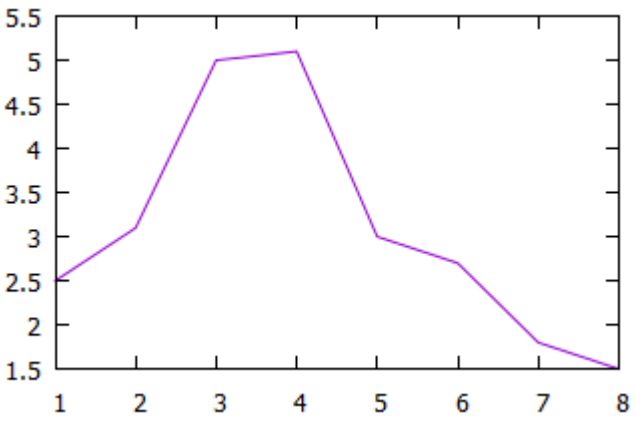
GNUPLOT COMMAND	OUTPUT
Consider you have the following data file saved in your Desktop as “data.txt”. **# X Y** **1 25** **2 30** **3 32** **4 35** **5 28** **6 25** **7 22** **8 21** **gnuplot>plot** 'data.txt'	
gnuplot>plot 'data.txt' pt 7 ps 1.5 pt : point type (1,2,3, etc) ps : point size	
Consider you have the following data file saved in your Desktop as “data3d.txt”. **# X Y Z** **1 25 2.5** **2 30 3.1** **3 32 5.0** **4 35 5.1** **5 28 3.0** **6 25 2.7** **7 22 1.8** **8 21 1.5** **gnuplot>splot 'data3d.txt' matrix with lines**	
Plot column1 vs colum3 and connect data points with lines **gnuplot> plot 'data3d.txt' using 1:3 with lines**	

Linear fitting using gnuplot

The distance required to stop an automobile is a function of its speed. The following data is collected to get this relationship:

```
24    4.8
32    6.0
40   10.2
48   12.0
64   18.0
80   27.0
```

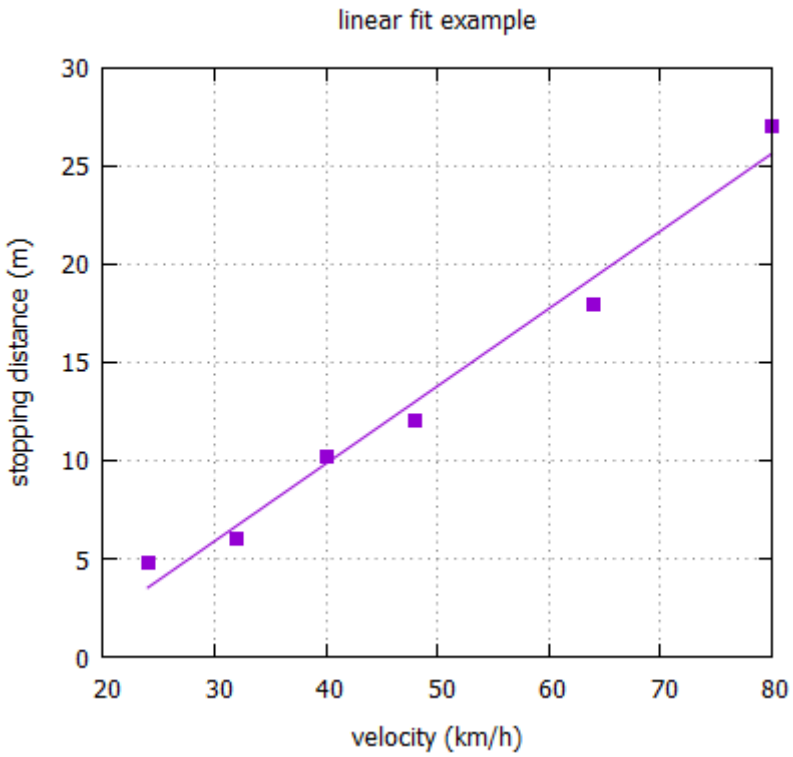
First column is the speed of the car in km/h and second column is measured stopping distance in meter.
The following script is useful for linear fitting:

```
# fitter.txt
reset
set grid
unset key
set title 'linear fit example'
set xlabel 'velocity (km/h)'
set ylabel 'stopping distance (m)'
f(x) = a*x + b
fit f(x) 'data.txt' via a,b
plot 'data.txt' pt 5 ps 1, f(x) lc 1
```

In gnuplot command line:

```
gnuplot> load 'fitter.txt'

Final set of parameters            Asymptotic Standard Error
=======================            ==========================
a                  = 0.394853      +/- 0.028        (7.09%)
b                  = -5.95294      +/- 1.446        (24.29%)
```



Non linear fitting using gnuplot

The same data can be fit to a non-linear function y = $ax^2 + bx$.

```
24    4.8
32    6.0
40   10.2
48   12.0
64   18.0
80   27.0
```

The script is

```
# fitter.txt
reset
set grid
unset key
set title 'linear fit example'
set xlabel 'velocity (km/h)'
set ylabel 'stopping distance (m)'
f(x) = a*x**2 + b*x
fit f(x) 'data.txt' via a,b
plot 'data.txt' pt 5 ps 1, f(x) lc 1
```

In gnuplot command line:

```
gnuplot> load 'fitter.txt'

Final set of parameters            Asymptotic Standard Error
=======================            ==========================
a                  = 0.00257446    +/- 0.0003253    (12.64%)
b                  = 0.127548      +/- 0.02105      (16.5%)
```