

GNUPLOT Quick Reference

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INGUNG

```
gnuplot
batch GNUPLOT
gnuplot macros | gnuplot
for environment variables you might want to change before entering GNUPLOT.
```

Help

`/PLOT` `quit`

mand-line Editing

X, MS-DOS and VMS versions of GNUPLOT support command-line editing and a com-
 history. EMACS style editing is supported.

help plot	topic	help available	current environment	show all
<topic>	help or ?			

back a single character	~ B
forward a single character	~ F
to the beginning of the line	~ A
to the end of the line	~ E
the previous character	~ H and DEL
the current character	~ D
to the end of line	~ K
s line in case it gets trashed	~ L, ~ R
the entire line	~ U
the last word	~ W
back through history	~ P
forward through history	~ N

Arrow	same as B
Left Arrow	same as F
Right Arrow	same as A
Up Arrow	same as E
Down Arrow	same as P
Same as N	same as N

Graphics Devices

All screen graphics devices are specified by names and options. This information can be read from a startup file (:gnuplot in UNIX). If you change the graphics device, you must replot with the `replot` command.

```
get a list of valid devices          set terminal [options]
```

AED 512 Terminal
set term aed512

```
set term amiga
set term adobe Illustrator 3.0 Format
set term apollo
set term Atari ST
set term BBN Bitgraph Terminal
set term SCO CGI Driver
set term Apollo graphics primitive, fixed window
set term gpr
set term SGI GL window
set term tris4d [8 24]
```

```

MS-DOS Kermit Tek4010 term - mono
MS-DOS Kermit Tek4010 term - color
NEXtstep window system
REGIS graphics language
Selanar Tek Terminal
SunView window system
Tektronix 4106, 4107, 4109 & 420X
Tektronix 4010, most TEK emulators
VAX VJS window system
VT-like tek40xx terminal emulator
UNIX plotting (not always supplied)
AT&T 3b1 or 7300 UNIXPC
X11 default display device
X11 multicolor point default device
set term X11
set term X11
set term unixpc
set term unixplot
set term vttek
set term VMS
set term tek40xx
set term tek40D10x
set term sun
set term selanar
set term regis
set term next
set term km_tek40xx

```

```

Hercules
Color Graphics Adaptor
Monochrome CGA
Extended Graphics Adaptor
VGA
Monochrome VGA
Super VGA - requires SVGA driver
AT&T 6300 Micro
set term hercules
set term cga
set term mcga
set term ega
set term vga
set term vgamono
set term svga
set term alt

```

MS Windows 3.x and OS/2 Presentation Manager are also supported.

Hardcopy Devices:

Unknown - not a plotting device
Dump ASCII table of X Y [Z] values
printer or glass dumb terminal
Roland DX80A plotter

Dot Matrix Printers

Epson-style 60-dot per inch printers
Epson LX-800, Star NL-10
NX-1000, PROPRINTER
NEC printer CP6, Epson LQ-800
Star Color Printer
Tandy DMP-130 60-dot per inch
Vectrix 384 & Tandy color printer

1es 483xwre1
 2es 609dywre1
 3es 483wre1
 4es 609wre1
 5es 008xwre1
 6es 008wre1
 7es 609wre1

Plotting Data

Discrete data contained in a file can be displayed by specifying the name of the data file (enclosed in quotes) on the **plot** or **splot** command line. Data files should contain one data point per line. Lines beginning with # (or ! on VMS) will be treated as comments and ignored. For **plots**, each data point represents an (x,y) pair. For **splots**, each point is an (x,y,z) triple. For **plots** with error bars (see **plot errorbars**), each data point is either (x,y,ylow,yhigh), (x,y,xlow,xhigh), or (x,y,xlow,xhigh,ylow,yhigh). In all cases, the numbers on each line of a data file must be separated by blank space. This blank space divides each line into columns.

For **plots** the x value may be omitted, and for **splots** the x and y values may be omitted. In either case the omitted values are assigned the current coordinate number. Coordinate numbers start at 0 and are incremented for each data point read.

Surface Plotting

Implicitly, there are two types of 3-d datafiles. If all the isolines are of the same length, the data is assumed to be a grid data, i.e., the data has a grid topology. Cross isolines in the other parametric direction (the ith cross isoline passes thru the ith point of all the provided isolines) will also be drawn for grid data. (Note contouring is available for grid data only.) If all the isolines are not of the same length, no cross isolines will be drawn and contouring that data is impossible.

For **splot** if 3-d datafile and using format (see **splot datafile using**) specify only z (height field), a parametric mode must be specified. If, on the other hand, x, y, and z are all specified, a parametric mode should be selected (see **set parametric**) since data is defining a parametric surface.

example of plotting a 3-d data
set parametric;splot 'glass.dat',
set nparametric;splot 'datafile.dat'

Using Pipes

On some computer systems with a popen function (UNIX), the datafile can be piped through a shell command by starting the file name with a '>'. For example:
pop(x) = 103*exp(x/10) plot ">awk '{ print \$1-1965 \$2 }' population.dat", pop(x)
would plot the same information as the first population example but with years since 1965 as the x axis.
Similarly, output can be piped to another application, e.g.
set out "lpr -Pmy_laser-printer"

T & SPLOT commands

plot are the primary commands **plot** is used to plot 2-d functions and data, while

<function> {<title>{style} {<function> {<title>{style}...}

function> is either a mathematical expression, the name of a data file enclosed in quotes, (plot) or triple (splot) of mathematical expressions in the case of parametric functions. and variables may also be defined here. Examples will be given below.

With Style

by be displayed in one of twelve styles: **lines**, **points**, **linespoints**, **impulses**, **dots**, **steps**, **lines** (or **yerrorbars**), **xerrorbars**, **xyerrorbars**, **boxes**, **boxxyerror-**
bars (or **yerrorbars**), **xerrorbars**, **xyerrorbars**, **boxes**, **boxxyerror-**
bars (or **yerrorbars**, **xerrorbars**, **xyerrorbars**, **boxes**, **boxxyerrorbars**, **steps**, **impulses**, **dots**, **lines**, **linespoints**, **points**, **lines**, **linespoints** style does both **lines** and **points**. The **impulses** style a vertical line from the x axis (or from the grid base for **splob**) to each point. The **dots** is a tiny dot at each point; this is useful for scatter plots with many points. The **steps** used for drawing stairstep-like functions. The **boxes** style may be used for barcharts.
errorbars style is only relevant to 2-d data file plotting. It is treated like **points** for **splob**s
tion **plots**. For data **plots**, **errorbars** is like **points**, except that a vertical error bar is
drawn: for each point (x,y), a line is drawn from (x,y,low) to (x,y,high). A tic mark is placed
ends of the error bar. The ylow and yhigh values are read from the data file's columns, as
with the **using** option to plot. The **xyerrorbars** style is similar except that it draws a
al error bar from xlow to xhigh. The **xyerrorbars** or **boxxyerrorbars** style is used for
h errors in both x and y. A barchart style may be used in conjunction with y error bars
the use of **boxxyerrorbars**. The See **plot errorbars** for more information.

styles are chosen with the **set function style** and **set data style** commands.

l, the style and (optionally) the line type and point type used for a curve can be specified.
<style> {<line type> <point type>}}
(or **lines**, **points**, **linespoints**, **impulses**, **dots**, **steps**, **errorbars** (or
lines, **points**, **linespoints**, **impulses**, **boxes**, **boxxyerrorbars**, **xyerrorbars**, **boxes**,
et type > & <point type> > are positive integer constants or expressions and specify the line
point type to be used for the plot. Line type 1 is the first line type used by default, line
the second line type used by default, etc.

(x) with impulses
with points, x**2 + y**2 default
plot [] [-2:5] tan(x)
plot "data.1" with lines
plot 'leastsq.dat' w l
plot 'exper.dat' w l, 'exper.dat' w err
per.dat' should have three or four data columns.
x**2 + y**2 and x**2 - y**2 with the
plot x**2 + y**2 w l 1, x**2 - y**2 w l 1
e type
(x) and cos(x) with linespoints, using
cos(x) w linesp 1 4
plot "data" with points 1 3
t the line style must be specified when specifying the point style, even when it is irrelevant.
The line style is 1 and the point style is 3, and the line style is irrelevant.

style to change the default styles.

Plot Title

A title of each plot appears in the key. By default the title is the function or file name as it appears
on the plot command line. The title can be changed by using the **title** option. This option should
precede any **with** option.
title ">title">
where <title> is the new title of the plot and must be enclosed in quotes. The quotes will not be
shown in the key.
plots y=x with the title 'x'
plot x
plot "glass.dat" tit 'revolution surface'
plots the "glass.dat" file
with the title 'revolution surface'
plots x squared with title "x^2" and "data.1"
plot x**2 t "x^2", \
"data.1" t 'measured data'
with title 'measured data'

Typing Labels

Labels can be placed on the plot using the **set label** command. If the z coordinate is a **plot** it is ignored; if it is missing on a **splot** it is assumed to be 0.

```
{<tag>}"<labeltext>" }
{at <x>,<y>,<z>}<justification>}
```

defaults to "", and the position to 0,0,0. The <x>, <y>, and <z> values are in the coordinate system. The tag is an integer that is used to identify the label. If no <tag> specific label. To change any attribute of an existing label, use the **set label** command appropriate tag, and specify the parts of the label to be changed.

the text is placed flush left against the point x,y,z. To adjust the way the label is placed with respect to the point x,y,z, add the parameter <justification>, which may be **left**, **center**, indicating that the point is to be at the left, right or center of the text. Labels plotted boundaries are permitted but may interfere with axes labels or other text.

```
set label "y=x" at 1,2
set label 3 "y=x^2" at 2,3,4 right
```

```
set label 3 center
set nlabel 2
set nlabel
show label
```

PIC, Image, LaTeX, and TPC drivers allow \ in a string to specify a newline.)

Simultaneous Commands

For information on these commands, print out a copy of the GNUPLOT manual.

```
cd
clear
exit or quit or EOF
print <expression>
pause <time> ["<string>"]
pwd
replot
! interactive shell
```

Expressions

In general, any mathematical expression accepted by C, FORTRAN, Pascal, or BASIC is valid. The precedence of these operators is determined by the specifications of the C programming language. White space (spaces and tabs) is ignored inside expressions. Complex constants may be expressed as {<real>,<imag>}, where <real> and <imag> must be numerical constants. For example, {3,2} represents 3 + 2i and {0,1} represents i itself. The curly braces are explicitly required here.

Environment Variables

A number of shell environment variables are understood by GNUPLOT. None of these are required, but may be useful.

If GNTERM is defined, it is used as the name of the terminal type to be used. This overrides any terminal type sensed by GNUPLOT on start up, but is itself overridden by the .gnuplot (or equivalent) start-up file (see **start-up**), and of course by later explicit changes. On Unix, AmigaOS, and MS-DOS, GNUHELP may be defined to be the pathname of the HELP file (gnuplot.gih).

On VMS, the symbol GNUPLOT\$HELP should be defined as the name of the help library for GNUPLOT. On Unix, HOME is used as the name of a directory to search for a .gnuplot file if none is found in the current directory. On AmigaOS and MS-DOS, GNUPLOT is used. On VMS, SYS\$LOGIN is used. See help start-up.

On Unix, PAGER is used as an output filter for help messages.

On Unix and AmigaOS, SHELL is used for the **shell** command. On MS-DOS, COMSPEC is used for the **shell** command. On AmigaOS, GNUFONT is used for the screen font. For example: "setenv GNUFONT sap-phire/14".

On MS-DOS, if the BGI interface is used, the variable **BGI** is used to point to the full path to the BGI drivers directory. Furthermore SVGA is used to name the Super VGA BGI driver in 800x600 res., and its mode of operation as 'Name.Mode'. For example, if the Super VGA driver is C:\TC\BGI\SVGADRV.BGI and mode 3 is used for 800x600 res., then: set BGI=C:\TC\BGI and 'set SVGA=SVGADRV.3'.

Functions

Functions in GNUMPLOT are the same as the corresponding functions in the Unix math library, except that all functions accept integer, real, and complex arguments, unless otherwise noted. The function is also supported, as in BASIC.

| Arguments | | Returns |
|-----------|--|---------|
| any | absolute value of x, x ; same type | |
| complex | length of x, $\sqrt{\text{real}(x)^2 + \text{imag}(x)^2}$ | |
| any | $\cos^{-1}x$ (inverse cosine) in radians | |
| complex | the phase of x in radians | |
| any | $\sin^{-1}x$ (inverse sin) in radians | |
| any | $\tan^{-1}x$ (inverse tangent) in radians | |
| radians | j_0 Bessel function of x | |
| radians | j_1 Bessel function of x | |
| radians | y_0 Bessel function of x | |
| radians | y_1 Bessel function of x | |
| any | $[x]$, smallest integer not less than x (real part) | |
| radians | $\cos x$, cosine of x | |
| radians | $\cosh x$, hyperbolic cosine of x | |
| any | Erfc(real(x)), 1.0 - error function of real(x) | |
| any | e^x , exponential function of x | |
| any | $ x $, largest integer not greater than x (real part) | |
| any | Gamma(real(x)), gamma function of real(x) | |
| any | Ibeta(real(p), q , x), ibeta function of real(p), q , x) | |
| any | Igamma(real(a), x), igamma function of real(a), x) | |
| complex | imaginary part of x as a real number | |
| real | integer part of x , truncated toward zero | |
| any | Lgamma(real(x)), lgamma function of real(x) | |
| any | $\log ex$, natural logarithm (base e) of x | |
| any | $\log_{10} x$, logarithm (base 10) of x | |
| any | Rand(real(x)), pseudo random number generator | |
| any | real part of x | |
| any | 1 if $x > 0$, -1 if $x < 0$, 0 if $x = 0$. imag(x) ignored | |
| radians | $\sin x$, sine of x | |
| radians | $\sinh x$, hyperbolic sine x | |
| any | \sqrt{x} , square root of x | |
| radians | $\tan x$, tangent of x | |
| radians | $\tanh x$, hyperbolic tangent of x | |

Operators

Operators in GNUMPLOT are the same as the corresponding operators in the C programming language, except that all operators accept integer, real, and complex arguments, unless otherwise supported, as in FORTRAN.

the ** operator (exponentiation) is supported, as in FORTRAN.

spaces may be used to change order of evaluation.