

graph twoway function — Twoway line plot of function

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Description

twoway function plots $y = f(x)$, where $f(x)$ is some function of x . That is, you type

```
. twoway function y=sqrt(x)
```

It makes no difference whether y and x are variables in your data.

Quick start

Graph the function $\ln\{x/(1-x)\}$ from 0 to 1

```
twoway function y = ln(x/(1-x))
```

Same as above

```
twoway function y = logit(x)
```

Graph the function $y = x^2$ from -1 to 1

```
twoway function y = x^2, range(-1 1)
```

As above, but as a horizontal graph

```
twoway function y = x^2, range(-1 1) horizontal
```

Probability density function of Student's t distribution with 4 degrees of freedom

```
twoway function y = tden(4,x), range(-4 4)
```

As above, but add the normal probability density function

```
twoway function y = tden(4,x), range(-4 4) || ///
function y = normalden(x), range(-4 4)
```

Add a legend

```
twoway function y = tden(4,x), range(-4 4) || ///
function y = normalden(x), range(-4 4) ///
legend(label(1 "t density with 4 df") ///
label(2 "Normal density"))
```

Normal probability density function with lines from the curve to 0 at -1.96 and 1.96

```
twoway function y = normalden(x), range(-4 4) dropline(-1.96 1.96)
```

Menu

Graphics > Twoway graph (scatter, line, etc.)

Syntax

```
twoway function [[y] =] f(x) [if] [in] [, options]
```

<i>options</i>	Description
<code>range(# #)</code>	plot over $x = \#$ to $\#$
<code>range(varname)</code>	plot over $x = \text{min}$ to max of <i>varname</i>
<code>n(#)</code>	evaluate at $\#$ points; default is 300
<code>droplines(numlist)</code>	draw lines to axis at specified x values
<code>base(#)</code>	base value for <code>dropline()</code> ; default is 0
<code>horizontal</code>	draw plot horizontally
<code>yvarformat(%fmt)</code>	display format for y
<code>xvarformat(%fmt)</code>	display format for x
<i>cline_options</i>	change look of plotted line
<i>axis_choice_options</i>	associate plot with alternative axis
<i>twoway_options</i>	titles, legends, axes, added lines and text, by, regions, name, aspect ratio, etc.

All explicit options are *rightmost*, except `horizontal`, which is *unique*; see [G-4] **concept: repeated options**.

if *exp* and *in* *range* play no role unless option `range(varname)` is specified.

In the above syntax diagram, $f(x)$ stands for an *expression* in terms of x .

Options

`range(# #)` and `range(varname)` specify the range of values for x . In the first syntax, `range()` is a pair of numbers identifying the minimum and maximum. In the second syntax, `range()` is a variable name, and the range used will be obtained from the minimum and maximum values of the variable. If `range()` is not specified, `range(0 1)` is assumed.

`n(#)` specifies the number of points at which $f(x)$ is to be evaluated. The default is `n(300)`.

`droplines(numlist)` adds dropped lines from the function down to, or up to, the axis (or $y = \text{base}()$ if `base()` is specified) at each x value specified in *numlist*.

`base(#)` specifies the base for the `droplines()`. The default is `base(0)`. This option does not affect the range of the axes, so you may also want to specify the *axis_scale_option* `yscale(range(#))` as well; see [G-3] *axis_scale_options*.

`horizontal` specifies that the roles of y and x be interchanged and that the graph be plotted horizontally rather than vertically (that the plotted function be reflected along the identity line).

`yvarformat(%fmt)` and `xvarformat(%fmt)` specify the display format to be used for y and x . These formats are used when labeling the axes; see [G-3] *axis_label_options*.

cline_options specify how the function line is rendered; see [G-3] *cline_options*.

axis_choice_options associate the plot with a particular y or x axis on the graph; see [G-3] *axis_choice_options*.

twoway_options are a set of common options supported by all *twoway* graphs. These options allow you to title graphs, name graphs, control axes and legends, add lines and text, set aspect ratios, create graphs over `by()` groups, and change some advanced settings. See [G-3] *twoway_options*.

Remarks and examples

[stata.com](https://www.stata.com)

Remarks are presented under the following headings:

Typical use

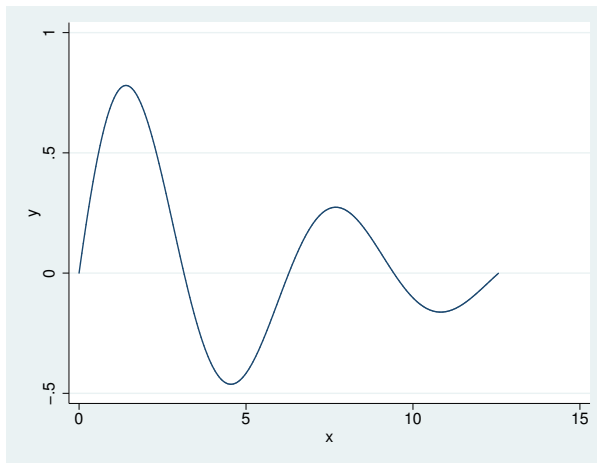
Advanced use 1

Advanced use 2

Typical use

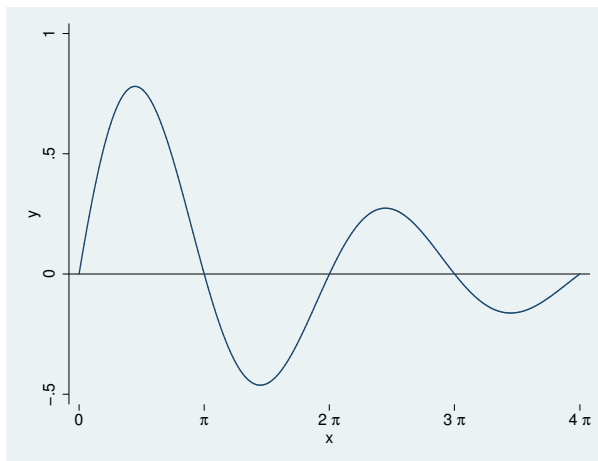
You wish to plot the function $y = \exp(-x/6)\sin(x)$ over the range 0 to 4π :

```
. twoway function y=exp(-x/6)*sin(x), range(0 12.57)
```



A better rendition of the graph above is

```
. twoway function y=exp(-x/6)*sin(x), range(0 12.57)
  yline(0, lstyle(foreground))
  xlabel(0 3.14 "{&pi}" 6.28 "2{&pi}" 9.42 "3{&pi}" 12.57 "4{&pi}")
  plotregion(style(none))
  xsca(noline)
```



`yline(0, lstyle(foreground))` added a line at $y = 0$; `lstyle(foreground)` gave the line the same style as used for the axes. See [G-3] [added_line_options](#).

`xlabel(0 3.14 "{&pi}" 6.28 "2{&pi}" 9.42 "3{&pi}" 12.57 "4{&pi}")` labeled the x axis with the numeric values given; see [G-3] [axis_label_options](#).

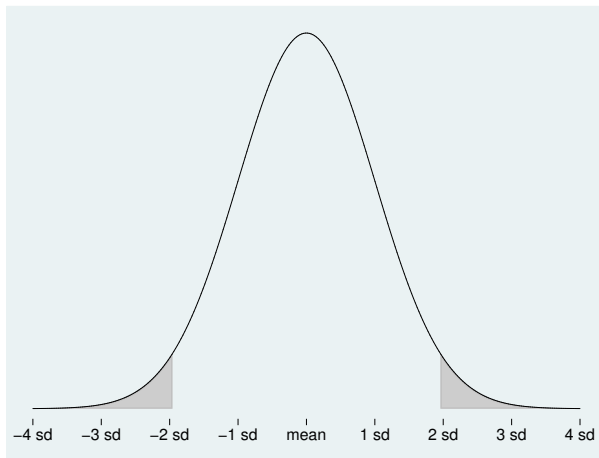
`plotregion(style(none))` suppressed the border around the plot region; see [G-3] [region_options](#).

`xsca(noline)` suppressed the drawing of the x -axis line; see [G-3] [axis_scale_options](#).

Advanced use 1

The following graph appears in many introductory textbooks:

```
. twoway
  function y=normalden(x), range(-4 -1.96) color(gs12) recast(area)
  || function y=normalden(x), range(1.96 4) color(gs12) recast(area)
  || function y=normalden(x), range(-4 4) lstyle(foreground)
  ||,
  plotregion(style(none))
  ysca(off) xsca(noline)
  legend(off)
  xlabel(-4 "-4 sd" -3 "-3 sd" -2 "-2 sd" -1 "-1 sd" 0 "mean"
         1 "1 sd" 2 "2 sd" 3 "3 sd" 4 "4 sd"
         , grid gmin gmax)
  xtitle("")
```

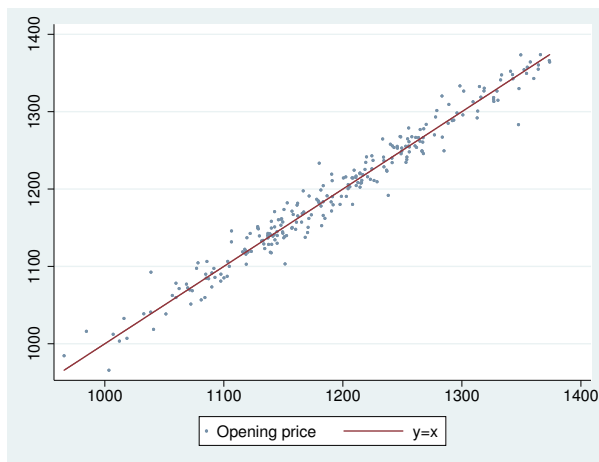


We drew the graph in three parts: the shaded area on the left, the shaded area on the right, and then the overall function. To obtain the shaded areas, we used the *advanced_option* `recast(area)` so that, rather than the function being plotted by `graph twoway line`, it was plotted by `graph twoway area`; see [G-3] *advanced_options* and [G-2] *graph twoway area*. Concerning the overall function, we drew it last so that its darker foreground-colored line would not get covered up by the shaded areas.

Advanced use 2

function plots may be overlaid with other twoway plots. For instance, function is one way to add $y = x$ lines to a plot:

```
. use http://www.stata-press.com/data/r15/sp500, clear
(S&P 500)
. scatter open close, msize(*.25) mcolor(*.6) ||
  function y=x, range(close) yvarlab("y=x") clwidth(*1.5)
```



In the above, we specified the *advanced_option* `yvarlab("y=x")` so that the variable label of y would be treated as “ $y=x$ ” in the construction of the legend; see [G-3] *advanced_options*. We specified

`msize(*.25)` to make the marker symbols smaller, and we specified `mcolor(*.6)` to make them dimmer; see [G-4] *relativesize* and [G-4] *colorstyle*.

Reference

Cox, N. J. 2004. *Stata tip 15: Function graphs on the fly*. *Stata Journal* 4: 488–489.

Also see

[G-2] **graph twoway line** — Twoway line plots