

Tricks with the graphing calculator (TI 83/84)

Graphing Piecewise functions

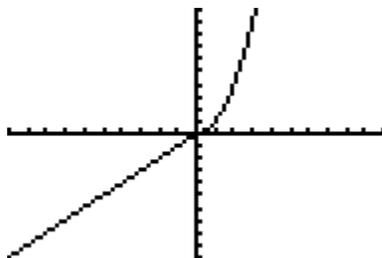
One way to graph a piecewise function with a graphing calculator is by using logical operators found in the TEST menu ([2nd] + [MATH]). Given this piecewise function:

$$f(x, y) = \begin{cases} x & \text{if } x < 0 \\ x^2 & \text{if } x \geq 0 \end{cases}$$

We can graph it by entering the sum of each sub-function multiplied by its domain, like this:

```

Plot1 Plot2 Plot3
\Y1=X*(X<0)+X^2*(
X≥0)
\Y2=
\Y3=
\Y4=
\Y5=
\Y6=
  
```



This method does not handle jump or removable discontinuities very well (they look like vertical lines, or zero), so do *not* use this method to answer questions about discontinuities!

Troubleshooting Tips

Radians and Degrees

If you are graphing a trig function or performing trig calculations, but you are getting strange values, your calculator may be working with the wrong scale. If you click the mode button at the top of the calculator, there is a setting to work in radians or degrees, and you can double check that it is using the setting you are expecting.

ERR: INVALID DIM

If you try to graph a function and get this message, it means the calculator is trying to graph points from a pair of lists, but it can't because they are different sizes (or empty). Usually this means the list graphing was accidentally turned on. To turn it off, press [2nd] and [Y=] to access the stat plot menu. One of the plots will probably be on, arrow to it, press enter, and then turn it off.

```

STAT PLOTS
1:Plot1...On
  L1 L2
2:Plot2...Off
  L1 L2
3:Plot3...Off
  L1 L2
4↓PlotsOff

2ND Plot2 Plot3
On Off
Type: [ ] [ ] [ ]
Xlist:L1
Ylist:L2
Mark: [ ] + .
  
```

Useful Features

The Manual:

There are a lot of useful features with this calculator, more than can fit on a few pages, but the instruction manual documents all of them, and can be downloaded for free from TI's website:

<http://education.ti.com/en/us/guidebook/details/en/ABF6D3DD944745A7A76609E97F84B1F7/83p>

Zooming:

When graphing, there are a number of useful built-in options for zooming found by pressing the zoom button in the middle of the top row. ZStandard sets your x and y ranges to (-10,10), and ZTrig sets a window suitable for graphing trig functions. More information can be found on page 138 of the manual.

```
MEMORY
1:ZBox
2:Zoom In
3:Zoom Out
4:ZDecimal
5:ZSquare
6:ZStandard
7↓ZTrig
```

Stored Variables and Constants:

When working with a long series of calculations, you can save the exact value for future use by using the STO (store) button above the ON key to save the answer to a variable. There are 27 variables available using the green alpha key: 26 letters of the alphabet and theta. The ans (2nd and minus) variable refers to the previous answer, and is automatically filled in if you start a calculation with an operator (+-* /).

```
5*9.3→A
46.5
A+1
47.5
█
```

Linear Regressions and Stat Operations

The TI 83 can perform many stats operations (such as linear regressions) for you. First put the data into a list (Stat button, then the edit menu option). Then you can press stat, right arrow to reach the cal (calculations) tab, and select 1-variable stats. This will provide information such as standard deviation, mean, median, and other values.

```
EDIT [STAT] TESTS
1:1-Var Stats
2:2-Var Stats
3:Med-Med
4:LinReg(ax+b)
5:QuadReg
6:CubicReg
7↓QuartReg

1-Var Stats
x=3
Σx=15
Σx²=55
Sx=1.58113883
σx=1.414213562
↓n=5
█
```

Derivatives and Integrals

The TI-83 has the ability to perform derivatives and definite integrals (see page 152 of the manual), though not symbolically (the TI-89 can). This means it can calculate $f'(5)$, but not $f'(x)$. This is useful for checking answers, but not much beyond that. Options 8 and 9 in the Math menu (numerical derivative, functional integral) work similarly: They require an expression, an independent variable (just in case you are using stored variables in your expression), and range values: see below.

```
NUM CPX PRB      nDeriv(X²,X,2)
4: *J(           4
5: *J           fnInt(X²,X,1,2)
6: fMin(         2.333333333
7: fMax(
8: nDeriv(
9: fnInt(
0: Solver...
```