

Pre-Calculus Graphing Calculator Workshop

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BASICS

- ✓ **ON**: Turns the calculator on. While the calculator is on, pressing this key stops the calculator from drawing a graph, transmitting files between two calculators, evaluating an expression, and so on.
- ✓ **2ndON**: Turns the calculator off.
- ✓ **2ndMODE**: Returns you to the Home screen.
- ✓ **ENTER**: Executes commands and evaluates expressions.
- ✓ **CLEAR**: Erases the last entry; clears the Home screen.
- ✓ **DEL**: Deletes the symbol under the cursor.
- ✓ **2ndDEL**: Inserts symbols to the left of the cursor.
- ✓ **2nd**: Used to access the secondary functions (labeled in blue above the keys).
- ✓ **ALPHA**: Used to access the green letters above the keys.
- ✓ **X.T.θ.n**: Pastes the variable into the definition of a function.
- ✓ **2ndENTER**: Copies the last entry onto the Home screen.
- ✓ **2nd(-)**: Pastes the last answer into an expression.
- ✓ **STO▶**: Assigns a value to a variable.

- ✓ **0**: Press **ALPHA** **3**.
- ✓ **π**: Press **2nd** **^**.
- ✓ **e**: Press **2nd** **÷**.
- ✓ **e^x**: Press **2nd** **LN**.

MODE menu:

```

NORMAL SCI ENG
FLOAT 0 1 2 3 4 5 6 7 8 9
RADIAN DEGREE
FUNC PAR POL SEQ
CONNECTED DOT
SEQUENTIAL SIMUL
REAL a+bi P&θi
HORIZ G-T
↓NEXT↓
  
```

```

↑BACK↑
MATHPRINT CLASSIC
m/d Un/d
ANSWERS: AUTO DEC FRAC
GOTOFORMATGRAPH: NO YES
STATDIAGNOSTICS: OFF ON
SET CLOCK 01/07/01 2:58AM
  
```

FORMAT menu: **2ND** **ZOOM**

```

RectGC PolarGC
CoordOn CoordOff
GridOff GridOn
AxesOn AxesOff
LabelOff LabelOn
ExprOn ExprOff
  
```

MATH menus:

MATH

```

MATH NUM CPX PRB
1: Frac
2: Dec
3: 3
4: √(
5: *√
6: fMin(
7: fMax(
  
```

```

MATH NUM CPX PRB
6: fMin(
7: fMax(
8: nDeriv(
9: fnInt(
0: summation Σ(
A: logBASE(
B: Solver...
  
```

NUM

```

MATH NUM CPX PRB
1: abs(
2: round(
3: iPart(
4: fPart(
5: int(
6: min(
7: max(
  
```

GRAPHING FUNCTIONS

- Inputting functions into **Y=**

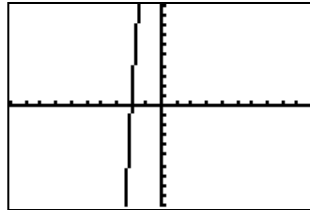
```

Plot1 Plot2 Plot3
\Y1=X^3-3X^2+20
\Y2=X^2
\Y3=
\Y4=
\Y5=
\Y6=
    
```

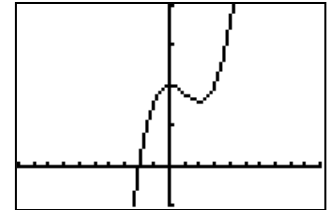
- Adjusting the **Window** to “see” the function

```

WINDOW
Xmin=-10
Xmax=10
Xscl=1
Ymin=-10
Ymax=10
Yscl=1
↓Xres=1
    
```



Not great.
Should look like:



- Different ways to **Zoom**

```

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

```

ZOOM MEMORY
8:ZInteger
9:ZoomStat
0:ZoomFit
A:ZQuadrant1
B:ZFrac1/2
C:ZFrac1/3
D:ZFrac1/4
    
```

- **ZBox**: Draws a box around a portion of the graph and redraws the graph in a viewing window that has the dimensions of the box.
- **Zoom In**: Zooms in on the graph at the location of the cursor.
- **Zoom Out**: Zooms out on the graph at the location of the cursor.
- **ZDecimal**: Draws the graph in a $-6.6 \leq x \leq 6.6$ and $-4.1 \leq y \leq 4.1$ window. When the graph is traced, the x-coordinate of the Trace cursor equals an integral multiple of 0.1.
- **ZSquare**: Redraws the graph in a window that makes circles look like circles instead of ellipses.
- **ZStandard**: Draws the graph in a $-10 \leq x \leq 10$, $-10 \leq y \leq 10$ window.
- **ZTrig**: Draws the graph in a $-11\pi/4 \leq x \leq 11\pi/4$ and $-4 \leq y \leq 4$ window. When the graph is traced, the x-coordinate of the Trace cursor equals an integral multiple of $\pi/24$.
- **ZInteger**: Redraws the graph so that when it is traced, the x-coordinate of the Trace cursor equals an integer.
- **ZoomStat**: Finds an appropriate viewing window for stat plots.
- **ZoomFit**: Finds an appropriate viewing window for graphing functions, parametric equations, polar equations, or sequences.
- **ZQuadrant1**: This command graphs your function in a preset viewing window where $0 \leq x \leq 13.2$ and $0 \leq y \leq 13.2$. When you trace a function graphed in this window, the x-coordinate of the Trace cursor will be a multiple of 0.1.
- **ZFrac1/2**: This command graphs your function in a preset viewing window where $-66/2 \leq x \leq 66/2$ and $-41/2 \leq y \leq 41/2$. When you trace a function graphed in this window, the x-coordinate of the Trace cursor will be a multiple of 1/2.

CALC menu: **2ND** **TRACE**

```
CALCULATE
1:value
2:zero
3:minimum
4:maximum
5:intersect
6:dy/dx
7:∫f(x)dx
```

- **Finding ZEROS, X-Intercepts, Roots**
- **Finding Maximums or Minimums (see next page)**
- **Finding points of Intersection between 2 graphs**

USING A TABLE

- **Table Set-up (TBLSET), 2ND WINDOW**
- **Generating function values (TABLE), 2ND GRAPH**

USING Y-VARS to evaluate a function

- **VARS**, **Y-VARS**, 1:Function
- **Shortcut:** **ALPHA TRACE**

```
Y1(3) 20
```


IF YOUR CALCULATOR STOPS WORKING CORRECTLY: RESET IT!

RESETTING THE CALCULATOR'S MEMORY Resetting the memory will erase all stored variables, programs, and commands. To do this, press **2ND +**,

press **7**,

press **1**,

press **2**.
The calculator's memory is now cleared.

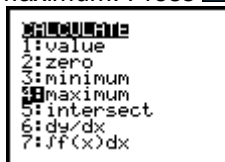


The image shows four sequential calculator screens illustrating the memory reset process:

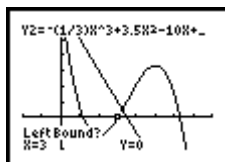
- Screen 1:** MEMORY menu with options: 1>About, 2:Mem Mgmt/Del..., 3:Clear Entries, 4:ClrAllLists, 5:Archive, 6:UnArchive, 7↓Reset...
- Screen 2:** ARCHIVE ALL menu with options: 1:All RAM..., 2:Defaults...
- Screen 3:** RESET RAM menu with options: 1:No, 2:Reset. Below the menu, it says: "Resetting RAM erases all data and programs from RAM."
- Screen 4:** TI-84 Plus 2.21 RAM cleared

Finding Maximum or Minimum values

The maximum option is used to find a relative maximum. Press **2nd** **TRACE**.

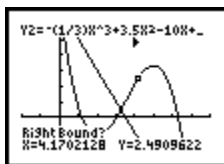


Press **4**. (The maximum option can also be obtained by using the **▼** to select option 4 and pressing **ENTER**.) Since a function may have more than one relative maximum, specify an interval containing the desired left point on the graph. (The equation in the upper left-hand corner indicates finding a relative minimum on the graph of the given function.)



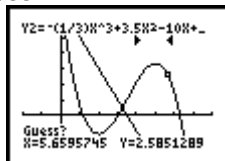
The question "Left Bound?" appears at the bottom of the screen. Use the **◀** to move the blinking cursor to the *left* of the relative maximum.

Press **ENTER**.

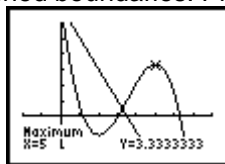


The question "Right Bound?" appears at the bottom of the screen.

Use the **▶** to move the blinking cursor to the right of the relative maximum. Press **ENTER**.



The arrows at the top of the screen indicate the boundaries between which the calculator will give the relative maximum. (The arrows must point toward each other.) The question "Guess?" appears at the bottom of the screen. Locate the cursor between the established boundaries. Press **ENTER**.



The coordinates of the maximum appear at the bottom of the screen. In this case the maximum point is $(5, 10/3)$.

Graphing a piecewise-defined function on the TI-83 or TI-84

To graph a piecewise-defined function, each piece of the function along with the x-interval for which the piece is defined must be entered into the $Y=$ screen.

For example, examine how the 3-piece function below is entered.

$$f(x) = \begin{cases} x^2, & x < 1 \\ x + 2, & 1 \leq x \leq 4 \\ 8 - x, & x > 4 \end{cases}$$

```

Plot1 Plot2 Plot3
\Y1=X^2(X<1)
\Y2=(X+2)(X≥1)(X
\Y3=(8-X)(X>4)
\Y4=
\Y5=
\Y6=
    
```

Note that parentheses must be placed around each inequality statement and each piece of the function if there is more than one term. The inequalities are found in the TEST menu, which is accessed by pressing **2nd** **MATH**.

To prevent the different pieces from being connected as the function is graphed, press **MODE** and select DOT.

```

Normal Sci Eng
Float 0123456789
Radian Degree
Func Par Pol Seq
Connected Dot
Sequential Simul
Real a+bi re^θi
Full Horiz G-T
    
```

Adjust the viewing window (if necessary) and press **GRAPH** to see the graph.

