

# Graphing Calculator Workshop Part I

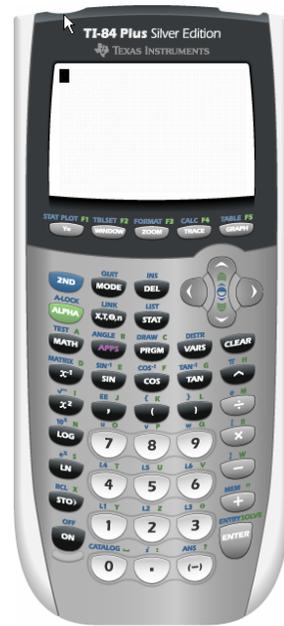
## Intro to the TI-83 and TI-84

### Part 1: How to Get Started

#### I. Turning the calculator ON and OFF

- ON: lower left hand corner
- OFF: yellow/blue  , then  .

**Is this all the 2nd key is for?**



#### II. Checking calculator defaults and other settings

- MODE: Press  which is located next to  .
  - Use the arrows to move the blinking box around the screen. To select a setting, put the box on the setting you want and press  .
  - Press  , then  (notice 'QUIT' written in yellow above MODE) to get out of the MODE menu.
  - Usually, everything along the left hand side should be selected, except in the third line down, where "Degree" should be selected.

**How do you select "Degree"?**

- Contrast: To darken the screen, press  and then the up arrow. Continue to use these two keys until the display is dark enough. The number in the box that flashes when you change your contrast indicates the level of contrast the screen is at. The full contrast range is from 0 to 9.

**How do you make the screen lighter?**

c. Batteries

- i. A good indication of batteries going weak is if, in order to see the display, a high level of contrast (8 or 9) is necessary.
- ii. A low battery message will be displayed before the calculator really dies. Don't wait to see this message, though, because it may happen in the middle of a midterm!

**Part 2: Using the Calculator**

**III. Basic mathematics operators (+, -, ÷, x)**

a. Located in the extreme right column of keypad

b. Subtraction  vs. negative : they are **not** the same

i. : performs the subtraction operation

ii. : indicates a negative number

c. Calculator follows order of operations

i. PEMDAS:

ii. When in doubt ... **use parentheses!**

a) Find  $\frac{22+14}{2}$

b)  $-5 * 10 + 3 - 6 =$

c)  $-5 * (10 + 3) - 6 =$

#### IV. Editing

- a. Left and right arrow keys to navigate within a line.
- b. ANS (  ,  ): brings back the last answer.
- c. ENTRY (  ,  ): gets the previous expression that was evaluated.
- d. Deleting and inserting
  - i. Deleting: Place the cursor over the item to be deleted; press  to delete the character.
  - ii. Inserting: Place the cursor immediately to the right of where you want to insert a character; press  , followed by  . *Your calculator stays in insert mode until you press  , or an arrow key.*
    - a)  $-5 * 10 + (3)(-6) =$

b)  $-5 * (10 + 3)(-6) =$

e.

- i. Press once to clear the current line
- ii. Press twice to clear the entire screen

#### V. Other features

- a. Exponents (powers): All powers can be expressed with the carat key:

**How do you find -5 cubed? -5 squared?**

- b. Roots: Find roots by raising the base (the number you want to find the root of) to a fractional power. For instance, the  $\sqrt{x}$  is  $x$  raised to the  $1/2$  power [ $x ^ (1/2)$ ].

**How do you find the square root of 64? There are two ways to do it!**

**How about the cube root of 64? There are two ways to do it!**

- c. Use ►Frac to convert decimals to fractions. The ►Frac feature can be found in the MATH menu. Access things in the MATH menu by pressing the  key. Then use the arrows to move the cursor to the operation you need and press enter.

To use ►Frac, you need to type in the decimal number, go to the MATH menu to get ►Frac, and press  .

**What is 0.8 as a fraction?**

- d. Absolute Value: When you need to find the absolute value of a number, or more importantly, if you need to graph  $y = /x/$ , you'll need to access the abs ( ) feature in the MATH menu.

Press  and press the right arrow to highlight NUM. Select abs( and press  . Now you can type the number that you want to find the absolute value of.

**What is  $\left|22 - \frac{333}{4}\right|$ ?**

## VI. Graphing

a. To begin a graphing session, press  $\boxed{Y=}$  to enter equations.

\* **Make sure that none of the Plots at the top of the screen are selected:** If any are, your graph can't be drawn. Use your arrow keys and  $\boxed{\text{ENTER}}$  to deselect any selected Plots.

**Enter this equation:**  $y = \frac{x^3}{40} + x^2 + 2.$

b. To tell the calculator to start drawing, press  $\boxed{\text{GRAPH}}$ .

c. To adjust the window, press  $\boxed{\text{WINDOW}}$ . Write the values for the standard window below

i. Xmin:

ii. Xmax:

iii. Xscl:

iv. Ymin:

v. Ymax:

vi. Yscl:

vii. Xres: Specifies pixel resolution; don't worry about this

d. To access the ZOOM features, press  $\boxed{\text{ZOOM}}$ , use the arrow keys to find the feature you want, and press  $\boxed{\text{ENTER}}$ .

i. ZBox: zooms in on a particular part of the graph when you draw your own box

ii. ZStandard: resets the window to a default scale

iii. ZPrevious: resets the window to a previous domain and range. This feature is in a submenu of the ZOOM screen. Use the right arrow key to highlight MEMORY and you will see ZPrevious.

e. To start tracing, press TRACE . Use the arrow keys to move around the graph.

f. The CALC menu contains math features for graphs: Access CALC by pressing 2nd , and then pressing TRACE .

i. intersect: finds the intersection point of two graphs

ii. zero: finds the roots of an equation

iii. minimum: finds 'minimum' values of a graph

iv. maximum: finds 'maximum' values of a graph

g. Find this information about the graph entered earlier:

i. Window/Range of an appropriate window:

Xmin:

Xmax:

Xscl:

Ymin:

Ymax:

Yscl:

ii. Zero(es):

iii. Minimum(s):

iv. Maximum(s):

## VII. Tables

a. Access the table by pressing  $\boxed{2\text{nd}}$ , and then pressing  $\boxed{\text{GRAPH}}$ . We will use the same equation that you used in example above.

b. You can adjust the table using the table setup. Access the table setup by pressing  $\boxed{2\text{nd}}$ , and then pressing  $\boxed{\text{WINDOW}}$ .

i. **Are there any values for which  $y = 77$ ?**

ii. **Find the value for  $y$  when  $x = 2.5$ .**

## VIII. Exercises

a. Solve:  $x^2 - 3 = 2x$

i. **Method I – Intersection:**

ii. **Method II – Zeros:**

iii. **Find where the graph of  $x^2 - 3 \geq 2x$ .**

b. **Where does  $\frac{3x^5 - 15x + 5}{x^7 - 8x^5 + 2x^2 - 5} = 0$ ?**