The TI-83 in College Algebra

Note: The words in capitals below represent buttons or menu items on the TI-83.

I. Getting Started. Turn on your calculator and clear the screen by pressing the CLEAR button. If this fails, press 2ND, QUIT to bring you back to the homescreen, and then CLEAR. The screen should be blank with the cursor blinking in the upper left corner.

Adjust the Contrast. If the screen appears too light or too dark you can adjust the contrast by pressing 2ND $\triangle$ or 2ND $\triangledown$ (keep toggling back and forth.) Sometimes the contrast is so light that the screen appears blank. Check this before replacing the batteries.

The Mode Setting. Press MODE. A menu will appear with various items highlighted. For the purposes of our class you should have every line highlighted on the left: NORMAL, FLOAT, etc. Use the arrow keys $\triangle$, $\triangledown$, $\triangleleft$, $\triangleright$ to scroll through the menu and type ENTER if you wish to change which item is highlighted. Type 2ND QUIT to return to the homescreen.

II. Arithmetic. Make sure the mode setting is as above before proceeding. See if you can do the examples below on your own before looking at the key strokes given.

Exponents. In general you will use the $\wedge$ key for an exponent, but there is also a special x^2 key and x^{-1} key that you may use for these two exponents. *Example.* To find 2^4 press 2 $\boxed{\wedge}$ 4 $\boxed{ENTER}$, to get 16. To find $(-3)^{23}$ press $\boxed{(}$ $\boxed{(-)}$ 3 $\boxed{)}$ $\boxed{\wedge}$ 23 $\boxed{ENTER}$ to get -9.414E10, which means -9.414×10^{10}. Note, you must use the key $\boxed{(-)}$ to enter a negative number and the key $\boxed{-}$ for subtraction.

Radicals. For square roots you can use the 2ND $\sqrt{}$ button, but for general radicals it is best to convert the radical to an exponent first using the relation $\sqrt[n]{x} = x^{1/n}$.

Example. Find $\sqrt[5]{823}$. Press 823 $\boxed{\wedge}$ $\boxed{(}$ 1 $\boxed{\div}$ 5 $\boxed{)}$ $\boxed{ENTER}$, to get 3.8289... An alternate way (in case you forget the exponent conversion) is to type 5 $\boxed{MATH}$ 5 (for selecting $\sqrt[x]{}$) and then 823 $\boxed{ENTER}$.

Using parentheses. If a numerator, denominator or exponent has more than one term make sure to use parentheses.

Example. Find $3^{-27+46.2}$. Press 3 $\boxed{\wedge}$ $\boxed{(}$ $\boxed{(-)}$ 27 $\boxed{+}$ 46.2 $\boxed{)}$ $\boxed{ENTER}$ to get 1447865069.

Example. Find $72\left(1+\frac{3}{17}\right)^{20}$. Press 72 $\boxed{(}$ 1 $\boxed{+}$ 3 $\boxed{\div}$ 17 $\boxed{)}$ $\boxed{\wedge}$ 20 $\boxed{ENTER}$ to get 1857.61, rounded to two places.

Example. Find $\frac{3.7}{-7.9+\sqrt{5}}$. Press 3.7 $\boxed{\div}$ $\boxed{(}$ $\boxed{(-)}$ 7.9 $\boxed{+}$ $\boxed{2ND}$ $\boxed{\sqrt{}}$ 5 $\boxed{)}$ $\boxed{)}$ $\boxed{ENTER}$. The answer is -.653256... (You will get an error message if you use the subtraction button $\boxed{-}$ instead of the negative number button $\boxed{(-)}$ for -7.9).

Editting Equations. Suppose we wish to change the previous example to $\frac{3.8}{-7.9+2\sqrt{5}}$. Press $\boxed{2ND}$ $\boxed{ENTRY}$ (in the lower right corner) and then move the cursor to the character you wish to change. Change 3.7 to 3.8. To insert the 2 in front of $\sqrt{5}$, type $\boxed{2ND}$ $\boxed{INS}$ and then 2. (Make sure that you don't get 7.92 instead of $2\sqrt{5}$.You can also use $\boxed{DEL}$ to delete a character.) Press $\boxed{ENTER}$ to get the answer -1.1086....

Now subtract 2.5 from the previous answer by simply typing $-$, 2.5, ENTER, to get -3.6086.

III. Graphing. Before starting this section, double check the MODE settings as shown above.

Format. Press 2ND FORMAT (at the top of the keyboard). Check that every line is highlighted on the left, RectGC, CoordON, GridOff, AxesOn, LabelOff, ExprOn. If not, move the cursor to the item you wish

to highlight and press ENTER. Type 2ND QUIT to return to the homescreen.

Stat Plots off. Check that all of the Statistics Plots are turned off on your calculator. (We won't be doing any statistics in this course.) To do this press the Y= key on the upper left corner of the keyboard. At the top of the screen you should see Plot1, Plot2, Plot3. Make sure that none of these plots are highlighted. If a plot is highlighted move the cursor to the spot and type ENTER to turn it off (unhighlighted). You are now ready to graph equations.

Standard Scale. Graph $y = x^2 - 2$ on a standard scale, $-10 \leq x \leq 10$, $-10 \leq y \leq 10$. Press Y= and make sure that the screen is clear by typing CLEAR if necessary on each line. The cursor should be blinking to the right of Y1= . To the left of Y1 you should see a diagonal series of four dots. If not see the Alternate graphs section below. Press X (which appears as X,T,θ, n on the calculator keyboard), x^2, $-$, 2. Now type ZOOM (at the top of the keyboard). A menu will appear will various options for graphing. To put your graph on a standard scale move the cursor down the menu to highlight 6:Zstandard and then type ENTER. Alternatively, you can simply press 6 on the keyboard right after pressing ZOOM. A parabola with vertex at (0,-2) opening upward should appear.

Alternate graphs. Return to the Y= screen and move the cursor to the left of Y1, Press ENTER repeatedly and notice how the icon changes . After each change in the icon type GRAPH to notice the effect on the graph. For this class you can leave the setting in the connected graph mode, which appears as the diagonal series of four dots.

Window settings. After pressing ZOOM, 6:Standard as above, press WINDOW. Xmin=-10 means the minimum value of x appearing on your graph is x=-10. Xmax, Ymin and Ymax are defined similarly. Xscl=1 means the tick marks on the x-axis are spaced 1 unit apart; similarly for Yscl=1. Always leave Xres=1 to give the most accurate looking graph; this is the resolution setting.

Trace. With the graph displayed, press TRACE and then $\triangleleft$ or $\triangleright$ and note the cursor move along the curve. The (x, y) coordinates are given at the bottom of the screen. To make the cursor jump, say to x=-3, just type (-), 3, ENTER.

Zooming in and out. Press ZOOM to display the zoom menu again. Press 2:Zoom In, ENTER to zoom in. Press 3:Zoom Out, ENTER to zoom out. Note the effect on the window settings. To view a selected part of the graph type 1:ZBox. Move the cursor to the upper left corner of the box you wish to view and type ENTER. Then move the cursor to the lower right corner and type ENTER.

Zoom Fit. Sketch the graph of $y = x^3 - 10x^2 + 6x + 30$ with $-5 \leq x \leq 15$. First enter the equation by pressing Y= , (CLEAR if necessary), $Y1 = X\hat{}3 - 10X\hat{}2 + 6X + 30$. Next type WINDOW, Xmin = -5, Xmax = 15. (The calculator will determine Ymin and Ymax.) Type ZOOM, and then scroll up to 0:ZoomFit and press ENTER or just type 0. The calculator will automatically set Ymin and Ymax to be the minimum and maximum values plotted, so that the graph "fits" the screen. Press WINDOW to find Ymin=-375, Ymax= 1245. To improve the appearance of the y-axis enter Yscl = 100 for the spacing of the tick marks.

IV. Making a Table. To make a table of values for the equation $y = x^3 - 2x$ first enter the equation on the Y= screen as above: $Y1 = X\hat{}3 - 2X$. Then press 2ND TBLSET (at the top left). You have the option of either inputting the x-values yourself or of letting the calculator generate the table for you.

Inputting values manually. To input the values yourself, ignore the top two lines on the menu. On the third line next to Indpnt (for independent variable), highlight ASK. On the fourth line, next to Depend, highlight AUTO. Now press 2ND TABLE (in the upper right corner). Press 6, ENTER, and you will see Y1= 204. Next input X= 2.305, ENTER. You will see Y1=7.6365. To see further decimal places for the value of Y1, move the cursor to highlight the value 7.6365. At the bottom of the screen you will see 7.636522625.

Letting the calculator generate the table. Suppose we wish to make a table of values with $x = 5, 7, 9, 11, 13$ ... for the equation $y = x^3 - 2x$. Press 2ND TBLSET. Set TblStart = 5, ΔTbl= 2 (for the size of the jumps), Indepnt: AUTO, Depend: AUTO. Then press 2ND TABLE.