Getting Started on your Graphing Calculator (82, 83, 85, 86) NAME:
Make sure you respond to the italicized questions and instructions. These will be graded.

To turn on your calculator, push the **ON** button in the lower left corner. Your calculator screen will go blank after about 5 minutes of non-use. If this happens, just push **ON** again.

Be aware that there are **2nd** functions and **ALPHA** functions for most of the buttons. For instance the **2nd** function of the **ON** button is **OFF**. So you would push the yellow **2nd** button (it's blue on the **TI82**) then the **ON** button to turn your calculator off. As another example, notice p is the **2nd** function of the ^ button, located above the division button. We'll use this later.

The home screen is where you will do simple calculations. To get to the home screen from another screen, press **EXIT** (**TI85 or 86**) or **QUIT**. Notice the **QUIT** button is the **2nd** function of the **MODE** button on the **TI82 or 83**.

A note for TI85 or 86 users: The menu system is quite different than the **TI83 or 82**. It contains essentially the same items but the format is different. Instead of menus that scroll down the screen, the menus are situated at the bottom of the screen. To explain this, let's play with the Graphing menus. Press the **GRAPH** button (below the **ALPHA**). A menu appears at the bottom of the screen. Notice there is an arrow to the right of this menu. Press **MORE** to see other options. To select an option, press the **F1** through **F5** buttons. Cycle through the options with the **MORE** button until you get to **ZOOM**. Select it by pressing **F3**. Notice a second set of options (the **ZOOM** menu) appears below the first menu. Use the **F1** through **F5** buttons to access these new options. You can choose the top menu options two different ways: 1.) Press **EXIT** to exit the first menu and then use the **F1** through **F5** keys as normal, or 2.) Press the **2nd** button and then the **F1** through **F5** keys. You'll notice that the second functions of these buttons are labeled **M1** through **M5** (meaning they access the top menus).

1. Start on the home screen. To practice using your calculator, we'll calculate $\frac{3^4+16}{5^2-10}$. You can put it all in your calculator at once, but you must have parentheses around the entire top and the entire bottom. To square the 5, use the $\mathbf{x^2}$ button located on the left of the calculator. To calculate exponents other than 2, you must use the ^ button. Try this now. Round your answer to two decimal places. *Write your answer down here.*

Did you get 6.47? If you did not, make sure you entered (3 ^ 4 + 16) / (5^2 - 10), then press **ENTER**. Notice the parentheses.

2. A nice function of your calculator is the fraction conversion function. This converts decimal answers to fractions. Let's convert our previous answer 6.47 into a fraction. Press the **MATH** button without erasing your answer from before.

On the **TI83 or 82**, the **MATH** button is on the left hand side. You want the first option that looks like **"[triangle] Frac"**. Push **ENTER** to enter **"[triangle] Frac"** onto the home screen.

On the **TI85 or 86**, the **MATH** menu is the second function of the multiplication button. The **"[triangle] Frac"** option is under **MISC** within the **MATH** menu. Once within the **MISC** menu, you need to press the **MORE** button to get to the **"[triangle] Frac"** option. Then press **F1** to select the **"[triangle] Frac"** option.

The screen, below the original answer, should read "**Ans [triangle]Frac**". The "Ans" stands for "Answer" as in the last calculation. Then hit **ENTER** again to have the calculator find the equivalent fraction. *What did you get?*

3. Now let's say we wanted to know the decimal approximation of $-2p$. Find it on your calculator now. You'll need to use the **2nd** function of the ^ button to get p. You can just enter $-2p$; you do not need a multiplication sign. Also, make sure you use the negative key, which looks like **(-)** within the gray number pad area, not the minus operation key on the right hand side. *What did you get?*

4. Let's graph $y = x^2 + 3$. You'll enter this into the **y=** editor.

On the **TI83 or 82**, press the little **y=** button in the upper left. To the right of the **y1=**, enter $x^2 + 3$. (Pressing the **X,T,** q **,n** button on the **TI83** and the **X,T,** q button on the **TI82** enters the x.) Then hit **ZOOM** and select **6:ZStandard**.

On the **TI85** or **86**, press the **GRAPH** button. It is located beneath the **ALPHA** button. Then select **y(x)=** by pressing the little **F1** button below the screen where it says **y(x)=**. Then enter $x^2 + 3$ into the space right of the **y1=** symbol. (Pressing the **x-VAR** button enters the x.) Press **EXIT** to reduce the double row of menus to one row, then select **ZOOM**. Then select **ZSTD**, this stands for **ZoomStandard**.

Notice this graphs the x-values from –10 to 10 and the y-values from –10 to 10. This is called the Standard Window. When graphing, this is a good screen to start with, especially if you do not know where the graph will be.
Copy your graph here.

5. Now let's graph $y = x^2 + 20$. Since the window is set to [-10,10]x[-10,10], we'll just enter the expression into the **y=** editor and hit **GRAPH**. (The special notation [-10,10]x [-10,10] denotes the interval of x-values and the interval of y-values.)

What happened? Do you see the graph? Why not?

We'll zoom out to see if we can see any of the graph.

On the **TI82 or 83**, press **ZOOM**, select **3:ZOOM OUT**.

On the **TI85 or 86**, press **F3** for **ZOOM**, and then select **ZOUT**. This stands for **ZOOM OUT**.

It will put a cursor on the screen. You must press **ENTER** again to make it zoom out, with the center of the new screen being where the cursor was.

6. Now that we can at least see the graph, let's get a nicer looking graph. We'll change the window (the *x* and *y* values graphed) so that we have a clearer picture of the graph.

On the **TI82 or 83**, press **WINDOW**.

On the **TI85 or 86**, select **RANGE** (on the **86**, **WIND**). You will need to press **EXIT** to get the menus back on screen, then **EXIT** again to get only one row of menus. Then select **F2** for **RANGE** (on the **86**, **WIND**).

This gives you a place to enter values for **xmin**, **xmax**, **xscl**, **ymin**, **ymax**, and **yscl**. (If you see it, do not worry about **xres**.) Enter –10 for **xmin**, 10 for **xmax**, –5 for **ymin**, and 50 for **ymax**. These values are the least *x* value, the biggest *x* value, the least *y* value, and the biggest *y* value graphed. The **xscl** and **yscl** tell the calculator how many units each tick mark on the axes will be worth. Set **xscl** to 1 and **yscl** to 10. Use the **arrow keys** to move up and down the screen.

Then have it graph with the new window. Notice how the screen looks, taking into consideration the tick marks on the axes and the *x* and *y* values shown.
Copy the graph here. Label the xmin, xmax, ymin, and ymax on your graph. Draw in the tick marks on the y-axis.

7. The **TRACE** function is nice to help us see specific points on the graph. It places a cursor on the graph itself and allows us to move along the graph, seeing the points' coordinates as we go. While still on the graph screen of $y = x^2 + 20$, press the **TRACE** button. This button is one of the little ones at the top.

On the **TI85 or 86**, the **TRACE** option is in the **GRAPH** menu.

Pressing the **TRACE** button should put a cursor on the graph itself. Move the cursor using the **left and right arrows**. As you do so, notice the points' coordinates are shown on the bottom of the screen. This function will allow you to copy graphs quite accurately on paper. Also be aware that sometimes the **TRACE** function starts the cursor off-screen. If this happens, you need to figure out where the cursor is using the points' coordinates displayed on screen and move the cursor (to the left or to the right) accordingly.

8. Let's explore more with the **TRACE** button. Get to the **y=** screen and put $y = 2x + 10$ into the space right of **y2=**. Leave the other expression in the **y1**= space.

On the **TI85 or 86**, press **EXIT** to get the menu back. And once you're on the line for **y1**, press the down arrow and it will create a space for **y2**.

So your calculator should be graphing both functions $y = x^2 + 20$ and $y = 2x + 10$ in the window [-10,10]x[-5,50]. Hit the **TRACE** button again. The cursor should start out on **y1**. Pressing the left and right arrows moves the cursor along this graph.

Pressing the **up and down arrows** moves the cursor off this graph and onto the other. Do this and then press left or right to move along the straight line $y = 2x + 10$. The arrows will work the same if you are using **TRACE** or the more complicated tools we will see later.

9. Usually when we are tracing along a function or simply moving the cursor around the screen, we want the calculator to show the points' coordinates and which function we are on. If your calculator did not show the points' coordinates as you traced along or did not indicate which function (1 or 2) that you were on, read over the following.

To highlight an option in the menus described below, arrow over to it and press **ENTER**.

The **TI82** labels this information automatically. I did not see a way to turn it off.

On the **TI85 or 86**, from the screen where the menus along the bottom are "**y(x)=, RANGE** (or **WIND**)**, ZOOM, TRACE, GRAPH**", press **MORE** to get to the option **FORMT**. This stands for "format". So press **F3** to select this option. You want **CoordOn** highlighted, not **CoordOff**. This will display, in the upper right corner of the screen, the number of the function the cursor is on. It will also denote the points' coordinates at the bottom of the screen.

On the **TI83**, press **2nd**, then **ZOOM**, whose second function is **FORMAT**. Highlighting **CoordOn** instead of **CoordOff** will display the points' coordinates as well as a small number in the upper right corner denoting the function. Highlighting **ExprOn** instead of **ExprOff** will display the function's equation in the upper left corner of the screen.

You should play around with this so you are comfortable with graphing and tracing along a graph.