Graphing Calculator Workshop

Workshop IV

Learning Objective

➢ In this workshop you will learn how to:

- Graph an absolute value function
- Graph a natural logarithm function
- Graph an exponential logarithm function
- Graph a logarithmic function of any base number
- Graph a trigonometric function (sine, cosine, or tangent)
- Find the numerical derivative of a function
- Find the numerical (definite) integral of a function

Graphing Calculator Workshop IV

1. Graph an Absolute Value Function

In order to graph an absolute value function, such as $f(x) = |x - 3|$:

Old OS

1. Press (Y=)
2. Press the MATH Key
3. Right arrow to NUM
4. Select option 1: abs(
5. abs(will appear, now type x-3 and close the parentheses by pressing the) key

New OS

1. Press (Y=)
2. Press the MATH Key
3. Right arrow to NUM
4. Select option 1: abs(
5. The absolute value bars will appear with a blank area in between (see picture below), this is where you type x-3
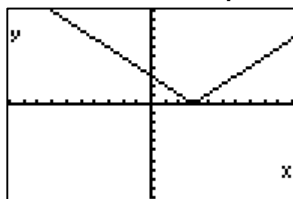
Old OS

New OS

Graph of $f(x) = |x - 3|$
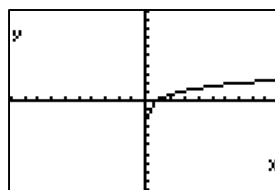

2. Graph a natural logarithm function

Let $f(x) = \ln(x)$ be the natural logarithm function that we need to graph by pressing (Y=) (LN) type x ( ) (GRAPH) and your function and graph should appear in the Y= and GRAPH screens as shown below

3. Graph an exponential logarithm function

When you need to graph an exponential logarithm function, for instance

$f(x)=e^x$, you need to press ⬚Y= ⬚2nd ⬚LN type the exponent x for
the given function and press ⬚) ⬚GRAPH. Then, this function and its graph
should appear in the Y= and GRAPH screens as shown below

| Old OS	New OS	Graph of $f(x)=e^x$
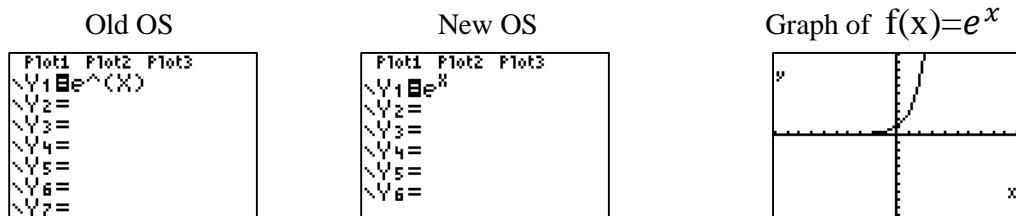
4. Graph a logarithmic function of any base number

a. To graph a logarithmic function of any base different from base ten, for
   example $f(x) = log_4 x$, we need to graph it in terms of base ten if you are
   using the old OS. For instance, this logarithmic function of base four
   will be typed with base ten as $f(x) = logX/log4$:

b. Once the function is changed to base ten, do the following selections:

press ⬚Y= ⬚log type **X** located on the key immediately to the right

of the ALPHA key and press ⬚) ⬚÷ ⬚log type 4 and press

⬚) ⬚GRAPH then the function and its graph should be shown on the
Y= and the GRAPH screen as follows:
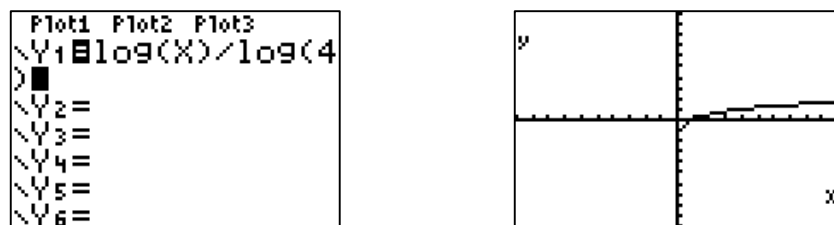
c. In the new OS, you do not have to change to base ten. Press (Y=), then press the MATH key, arrow down to option A: logBASE and press enter. The display now shows:

```
Plot1  Plot2  Plot3
\Y1■log▯(▯)

\Y2=
\Y3=
\Y4=
\Y5=
```
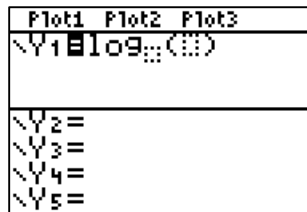
Now type in the base (which was 4) and the argument (which was X) in the appropriate areas:

```
Plot1  Plot2  Plot3
\Y1■log4(X)

\Y2=
\Y3=
\Y4=
\Y5=
```
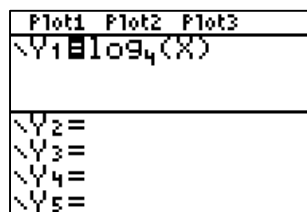
5. Graph a trigonometric function (sine, cosine, or tangent)

a. When you use trigonometric functions in your calculator, you need to know that the current angle mode setting affects interpretation. For instances if the angle values you use are in degrees, you need to press the MODE key to set up the angle mode in degrees; if your angle values are in radians, you select radians with the MODE key. In addition, in order to see the graph with the right shape of a trigonometric function, you need to set up the angle mode in radians using the MODE key.
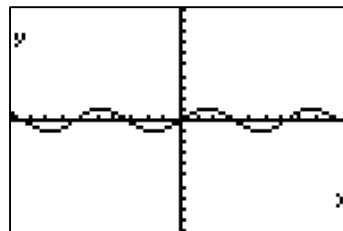
b. Let f(x) = sin(x) be the trigonometric function that you need to graph. After you select the appropriate angle mode, you can follow the next step to type and graph this function. Press (Y=) (sin) type **X** located on the key immediately to the right of the ALPHA key and press ( ) (GRAPH).

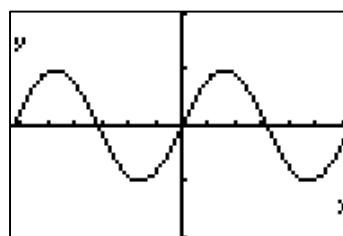Then the function and its graph (in the standard window) should be shown as follow in your calculator.

By changing the window, we can get a better view of the graph:

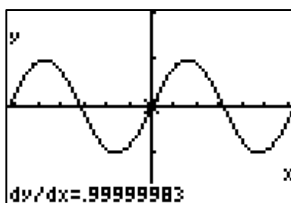
6. Find the numerical derivative of a function

Use the given graph from part 5b to find its numerical derivative at a specific "x" value. Once you are on the graph, press 2nd TRACE and select **6:dy/dx** from the CALCULATE menu; when you select this item, you should see your graph again with the function on the upper left corner of the screen.
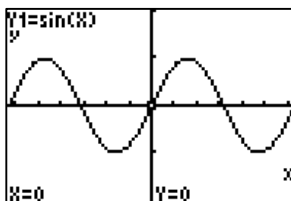

Next, you just need to type the "x" value to find its numerical derivative for the given function. For instance, type 0 and the derivative value should be equal to one (it would probably appear as a decimal number very close to one as it is shown in the lower left corner of the picture below).

7. Find the numerical (definite) integral of a function

Use the given graph from part 5b to find its numerical integral between two "x" values (find it between x=0 and x=π). Once you are on the graph, press (2nd) (TRACE) and select **7:∫ f(x)dx** from the CALCULATE menu; when you select this item, you should see your graph again with the function on the upper left corner of the screen and the question "lower limit? on the lower left corner of the graph as shown below
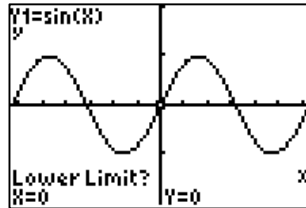
Type the number that represents your lower limit and press (ENTER); now, the calculator is asking you for the upper limit. It should appear in your screen as follow
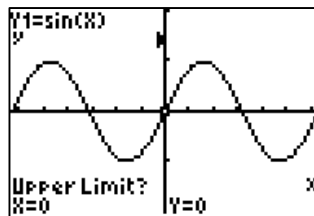
Finally, type (2nd) (^) to insert the upper limit π and press (ENTER). The numerical integral should be equal to 2, and it should appear on the lower left corner of your graph as it is shown below.