SyMan Lesson 8: Sine Curves

In a previous exercise, you worked with some of SyMan's basic graphing abilities. In this exercise, you will use those capabilities to to explore the curve of `y = sin(x)`. (pronounced "y equals **sign**-x," not "y equals sin-x")

As you follow along with the example below, be sure to read the explanation after each step. These explanations tell you why you are doing each step, and give further helpful advice.

Step 1 **Enter and graph the function `y=sin(x)`. Sketch the graph of this function below.**

Step 2 **Without clearing the graph display, enter and graph the function `y=2sin(x)`. How does the second graph compare to the first?**

The amplitude of a sine curve is one-half the peak-to-peak height of the graph. For example, in Step 1 the peak-to-peak height was `2` (from `-1` to `+1`), so the amplitude was `2÷2 = 1`. The amplitude of the sine curve in Step 2 is `4÷2 = 2`.

Step 3 **What equation would you enter to graph a sine curve with an amplitude of `5`? Test your answer by graphing it.**

`y =` _____

Step 4 **Clear the graph and re-graph `y=sin(x)`, then graph `y= -sin(x)`. How do the two graphs compare?**

Step 5 **What equation would you enter to graph a sine curve that is "upside down" and has an amplitude of `3`? Graph your answer to check it.**

`y =` _____

Step 6 **What equation would you enter to graph a sine curve that is "upside down" (reflected in the x-axis) and has an amplitude of `2.5`? Graph your answer to check it.**

`y =` _____

Step 7 **Clear the graph and re-graph `y=sin(x)`, then graph `y=sin(x+0.1)`. How do the two graphs compare?**

Step 8 **Graph `y=sin(x-0.1)`. How does this graph compare to the original `y=sin(x)`?**

Step 9 **What equation would you enter to graph a sine curve that is shifted to the RIGHT by `0.25`? Graph your answer to check it.**

`y =` _____

Step 10 **What equation would you enter to graph a sine curve that is shifted to the LEFT by `0.15`? Graph your answer to check it.**

`y =` _____

When you have completed Steps 1 through 10, go on to answer the following questions:

1.) Write down the equation that produces a sine curve with the specified characteristics. Recall that "upside down" is another way of saying "reflected in the x-axis".

a) amplitude of `2` `y =` _____

b) amplitude of `4`, reflected in x-axis `y =` _____

c) amplitude of `0.25`, reflected in x-axis `y =` _____

d) amplitude of `\f(1,2)` `y =` _____

e) amplitude of `\f(1,10)` reflected in x-axis `y =` _____

f) amplitude of `2.5`, shifted right `0.5` `y =` _____

g) amplitude of `5`, shifted right `\f(1,5)` `y =` _____

h) amplitude of `2`, shifted left `0.13`, reflected in x-axis `y =` _____

i) amplitude of `4`, shifted right `\f(1,5)` reflected in x-axis `y =` _____

j) amplitude of `\f(1,4)` shifted left `\f(1,2)` `y =` _____

2.) On a clear graph, graph `y=sin(x)`, then graph `y=sin(x + 6.283185307)`.

What do you notice about the second curve as compared to the first one? It may help to clear the graph again, and just graph the second curve.

3.) How much of a negative shift is required to produce a sine curve that is identical to the original? (find a value less than zero and greater than `-12`)

`y = sin(x - _____)`

4.) The shift left or right applied in questions 3 and 4 is really `2π` since `(2)(3.141592654)` is approximately `6.283185307`.

How do the original and shifted graphs relate when you apply a shift of `4π`, `6π`, or any even multiple of `π`?