



Math Analysis
Investigating Sin and Cos

Name _____
Date _____

Click on the Math Box  and type the following:
 $f(x) := A \cdot \sin(B \cdot x - C) + D$ and hit Enter (It should say "Done")
 $g(x) := A \cdot \cos(B \cdot x - C) + D$ and hit Enter (It should say "Done")


We will now create sliders for the variables A, B, C, and D.

Enter to the next line in the document and type A: and space twice.

Choose the . Fill in the information using the table below then click OK. Enter to the next line and follow the same procedure to create the sliders for B, C, and D (Enter after each slider so they are each on a separate line). Enter twice after the last slider.

Variable	Initial	Minimum	Maximum
A	1	-5	5
B	1	$-2 \cdot \pi$	$2 \cdot \pi$
C	0	$2 \cdot \pi$	$2 \cdot \pi$
D	0	-5	5

We will now graph our two functions.

Click the graph icon . This will open a Functions window and a Graph window. In the Functions window you will see $y_1(x)$ and $y_2(x)$. For $y_1(x)$ type $f(x)$ and for $y_2(x)$ type $g(x)$. You will notice that these functions have graphed on your Graph window.


We only want to see one cycle for each function so we need to change our viewing window.


Click . A window opens allowing you to change the viewing window of your graph (along with other things). First, uncheck the Auto XStep box. Then input these values for your window:

xmin: 0 xmax: $2 \cdot \pi$ xscale: $\pi/2$
ymin: -5 ymax: 5 yscale: 1

Hit Apply and then OK (If you don't hit apply, it won't change your window).

We now want to label our graphs so we don't forget which is which.

Click the label icon . Where it says Label text, type $\sin(x)$. Click Font and go to the color options. Scroll down to choose Blue and click ok. Repeat these steps for $\cos(x)$ but choose Red. Place these labels in one of the corners of your graph so they are out of the way while we investigate the two functions.

If you click the Animate icon , it will redraw the graphs for you. If you click on the colored line in the Functions window, you can change how it animates your graph by using the path, a symbol, or both.

Click the Close button (x) on the Graph window to save the graph to your document. We are now ready to investigate our two functions. Make sure to answer the questions during your investigation.

Questions

- 1) Start moving slider A to the right by clicking on the right arrow. What happens to your functions as A increases?
- 2) What happens to your functions as A decreases?
- 3) At one point, your graph appears to disappear. At what value of A does this happen and why?
- 4) Return your A slider to 1. Increase your B slider. What happens to your functions as B increases?

- 5) What happens to your functions as B decreases?
- 6) What happens to your functions when B is 0?
- 7) Return your B slider to 1. Increase your C slider. What happens to your functions as C increases?
- 8) What happens to your functions as C decreases?
- 9) Return your C slider to 0. Increase your D slider. What happens to your functions as D increases?
- 10) What happens to your functions as D decreases?

At this point, you can investigate on your own moving sliders together. When finished, put your labels right next its appropriate graph. Save the file as Investigating Sin and Cos. Print a hard copy to put in your notes.