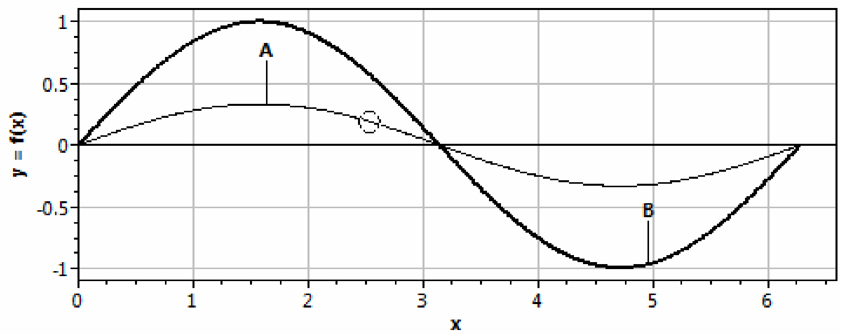
IB – SL Math Portfolio *Locci*
Jonathan

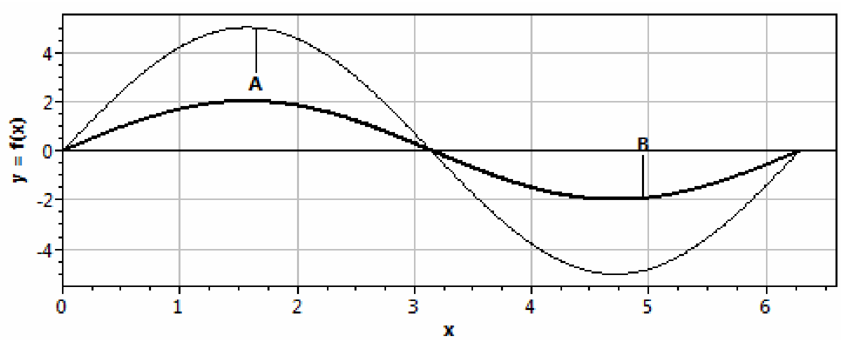
Investigating the graphs of sine function

In this investigation, we are going to look at the different graph of y=sin x. We are going to compare and investigate the graphs of y=A sin x, Y=sin Bx and y= sin(x+C). We are going to look what the different value and what are the effect s on the sin graph.

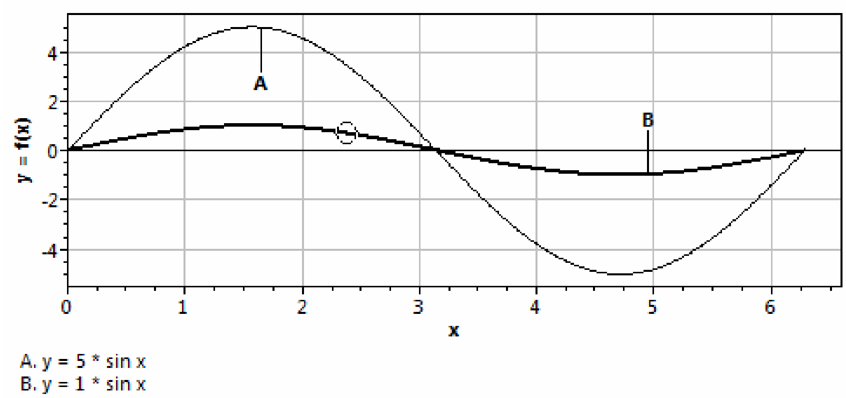
Part 1: Investigation of the graphs y = sin x



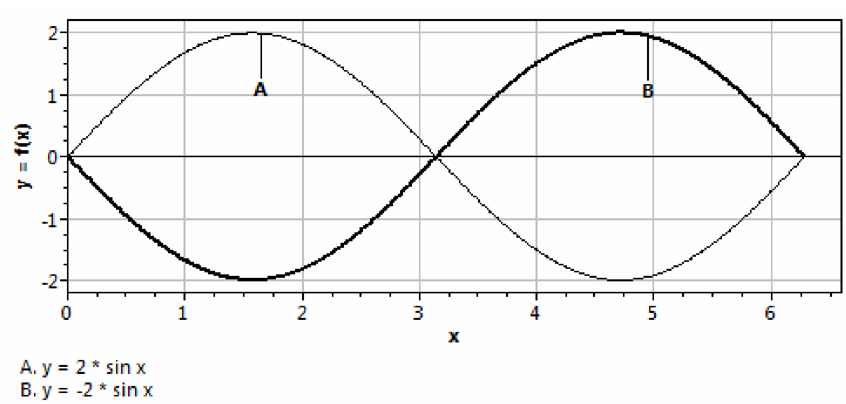
A. y = 1 / 3 * sin x
B. y = 1 * sin x



A. y = 5 * sin x
B. y = 2 * sin x

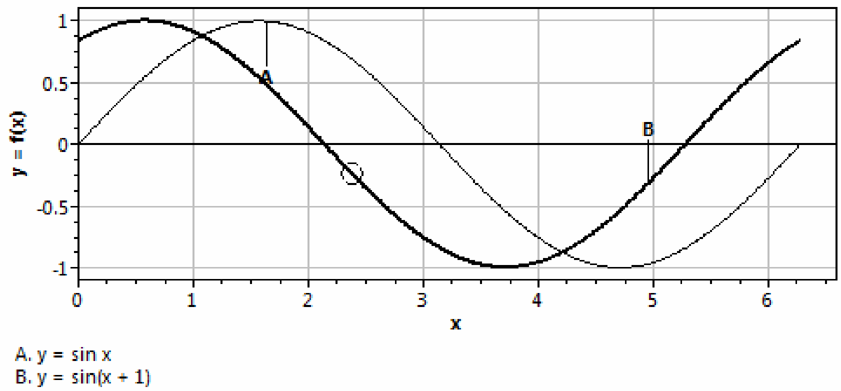


In the graphic 5 sin x, as you can see is much stretched because the amplitude is greater in 5 sin x than 2 sin x. But you can also see that in 2 sin x, the graph is much wider the 5 sin x. So we can conclude that more the amplitude is low and more the graph is wide.

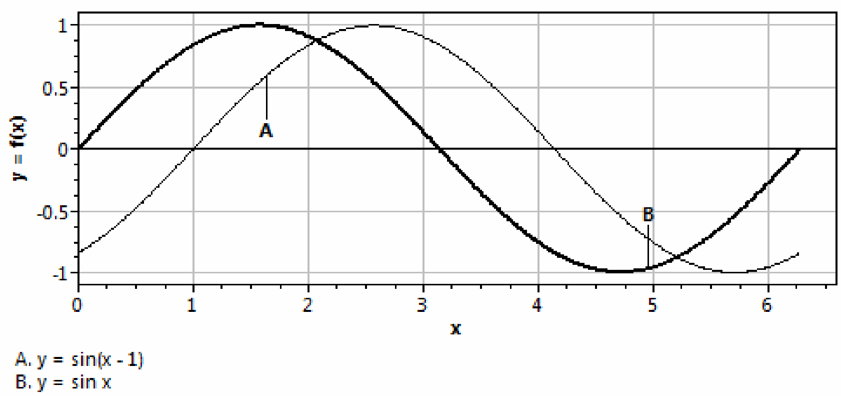


I put -2 sin x to show that when the value of the amplitude is negative, the graph will flip up sat down.

Part 3: Investigation of the graphs y = sin (x+C)

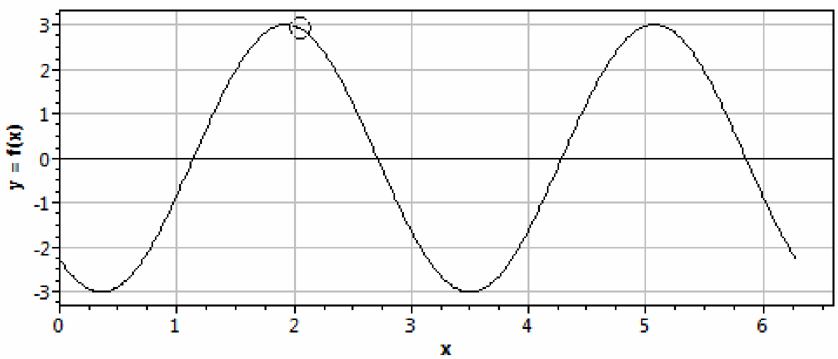


I choose sin (x+1) and sin x to show that when the number is positive, the period will move to the left by one because it will start at 1 for the amplitude.



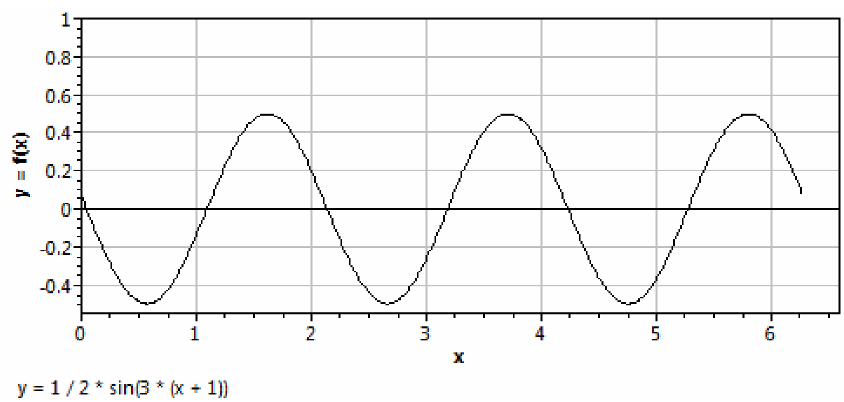
Here you can see that when the value in the parenthesis is negative, the period will shift to the right by one and the amplitude will start at -1.

Part 4: Prediction of the shape and position of the graphs

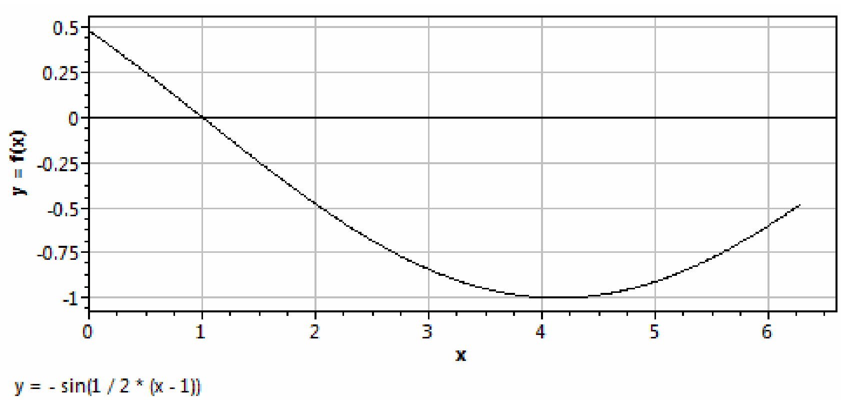


y = 3 * sin(2 * (x + 2))

So, based on what I did,I saw that the value of the amplitude was 3 so a positive but I didn't use well the (x + 2) because I thought it would be more far to the left.



For this graph, it was pretty hard to predict, the amplitude is 1/2 which is positive but because of +1, we will move to the left. Y ou can see that I was right for the value B when it says sin3, I had the right period.



This one I really had a good prediction, I knew that the amplitude would be on 0.5 and since the amplitude is a -1it would be up sat down but because of the (x-1) the amplitude start at 0.5. I knew as well that the value B in sin1/2 would be very wide period.

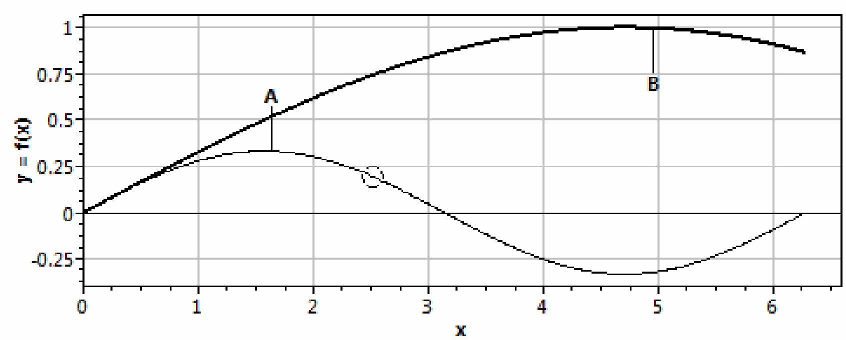
Y = A sin B(x + C)

In this graph, there is three different value A, B and C. The value A is the amplitude, if it 1 the amplitude will be 1 but if it's a negative 1, the graph will have to flip up sat down.

The value B it determine the period, so if the value will be 1/2, the period will be longer therefore it would be wide r that for example 3. More the Value B is lower and more the period will be wider.

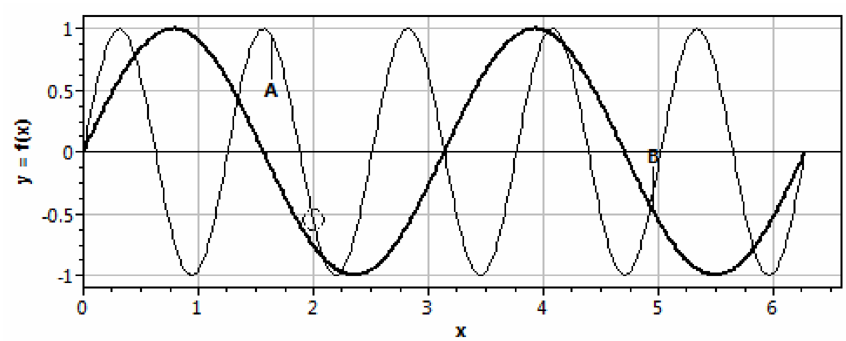
The value C is the one that determine what side you are going to shift the graph, if it is positive it will shift to the left and if it is a negative it will move to the r ight

Part 2: Investigation of the graphs y = sinBx



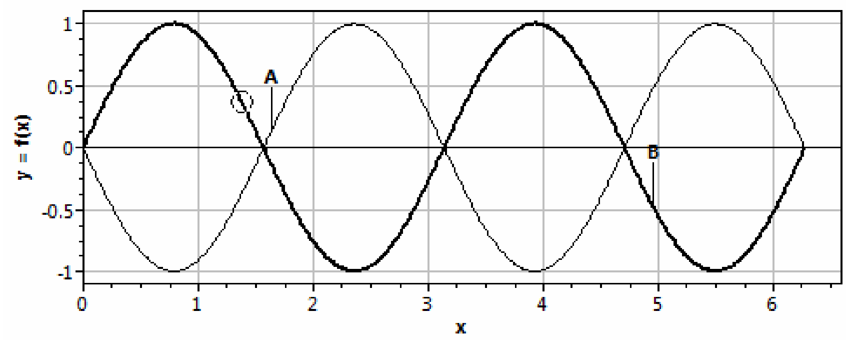
A. y = 1 / 3 * sin x
B. y = sin(1 / 3 * x)

Here we can see that it is very different that 1 /3 sin x. The period on sin 1/3 x is much more widely than 1/3 sin x.



A. y = sin(5 * x)
B. y = sin(2 * x)

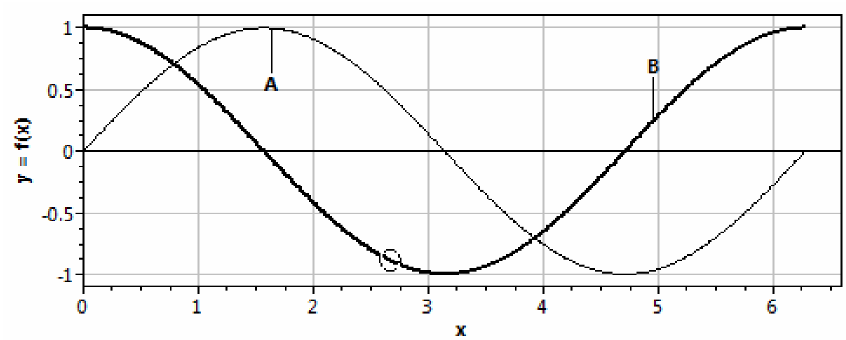
In those graphs, we can clearly see that the period in the graph sin 5x is shorter than the sin 2x. Therefore more the value of B is lower and more the curve of the graph will be wide. Now lets try with a negative.



A. y = sin(-2 * x)
B. y = sin(2 * x)

Like in the graph y = A sin x, if the value of x is a negative, the graph will flip up sat down.

Part 5: Investigation of the graphs y = cos x and y = sin x



A. y = sin x
B. y = cos x

The graphs cos x is linked to the graph sin x , because it has the same curvy line but it has also the same amplitude which is 1.

But The difference is the location of the relative along the x -axis. For cosine function, you need to think about the unit circle. At a rotation of π /2 radians, the cosine component of the image is 0. Another π/2 radians, you go back to 1. A sine function it is one rotation of π /2 behind the cosine function. So all that's keeping them from being the same function is the difference if π /2.