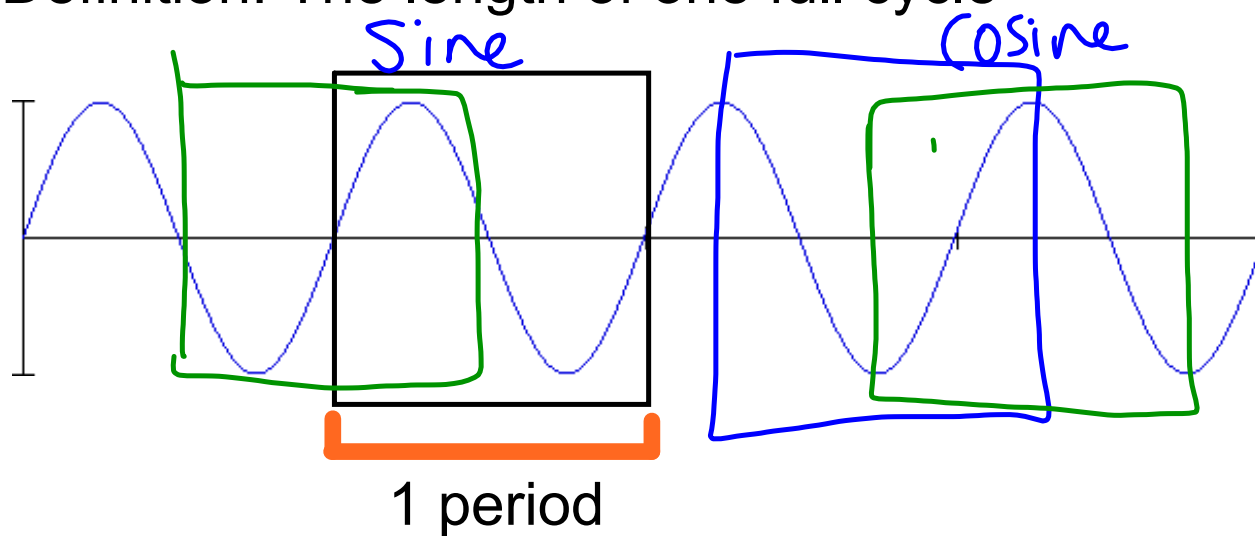


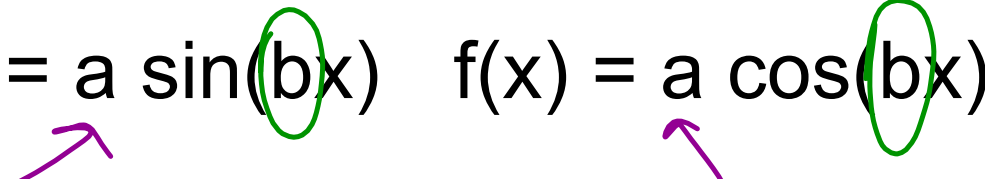
## Part II: Period

Definition: The length of one full cycle



For  $f(x) = \sin(x)$  and  $f(x) = \cos(x)$ , the period is always  $2\pi$ .

**How to determine the period of a function:**

$$f(x) = a \sin(bx) \quad f(x) = a \cos(bx)$$


$$\text{Period} = \frac{2\pi}{b}$$

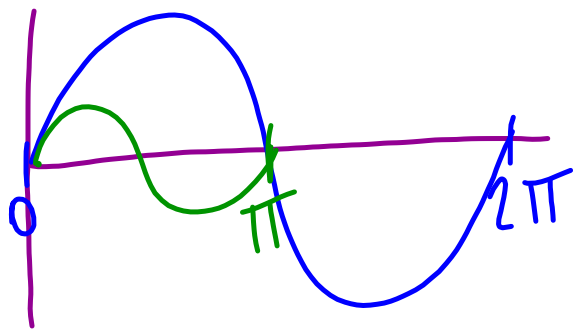
Determine the period and amplitude of the following functions.

$$b = 2$$

Ex. 6)  $f(x) = 6 \sin(2x)$

$$\text{Amp} = 6$$

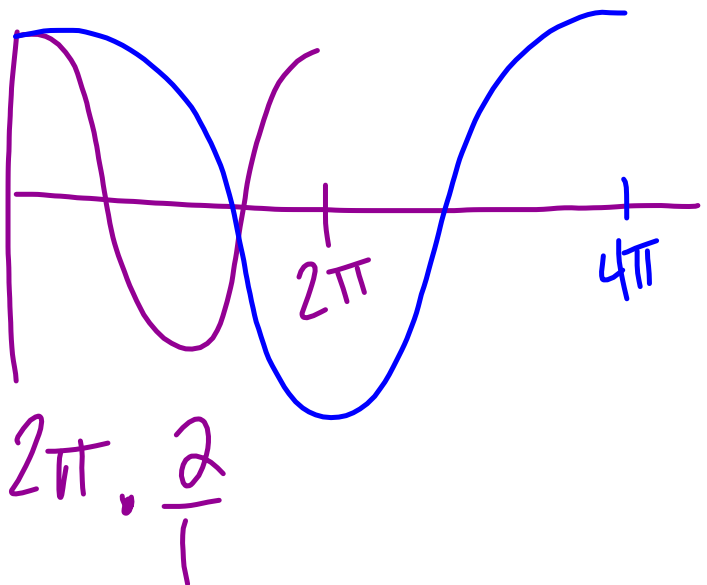
$$\text{Per.} = \frac{2\pi}{2} = \pi$$



Ex. 7)  $f(x) = 3 \cos\left(\frac{1}{2}x\right)$

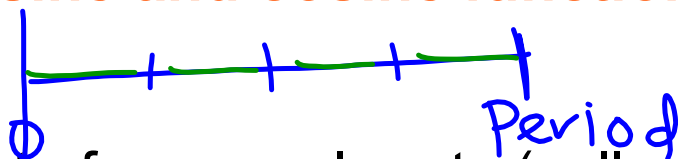
$$\text{Amp: } 3$$

$$\text{Per: } \frac{2\pi}{\frac{1}{2}} = 4\pi$$



## Steps to graphing a sine and cosine function

1. Find the period



2. Divide the period into four equal parts (called the interval)

3. Determine and Plot the 5 points in the period.

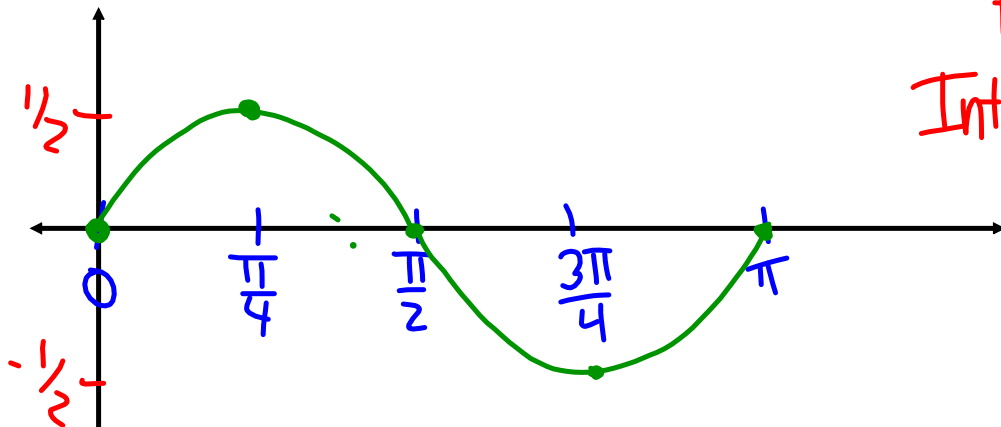
4. Draw the curve of the function using the amplitude

$$\text{Interval} = \frac{\text{Period}}{4} = \text{Per} \cdot \frac{1}{4}$$

Graph the following functions (one full period)  
(Be sure to use 5 key points!)

Ex. 8)  $f(x) = \frac{1}{2} \sin(2x)$

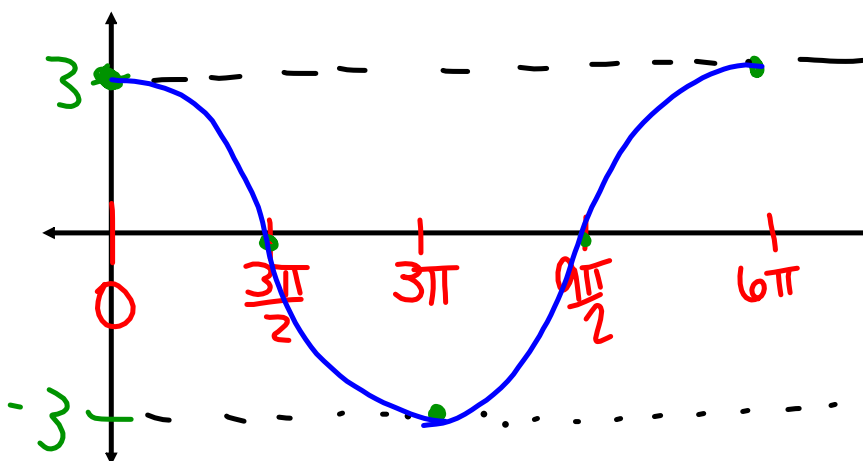
Amp:  $\frac{1}{2}$   
Per:  $\frac{2\pi}{2} = \pi$   
Interval:  $\frac{\pi}{4}$



$$0 + \frac{\pi}{4} = \frac{\pi}{4} + \frac{\pi}{4} = \frac{2\pi}{4} + \frac{\pi}{4} = \frac{3\pi}{4} + \frac{\pi}{4} = \frac{4\pi}{4}$$

Ex. 9)  $f(x) = 3 \cos\left(\frac{1}{3}x\right)$

Amp: 3  
Per:  $\frac{2\pi}{1/3} = 2\pi \cdot \frac{3}{1} = 6\pi$   
Int:  $\frac{6\pi}{4} = \frac{3\pi}{2}$

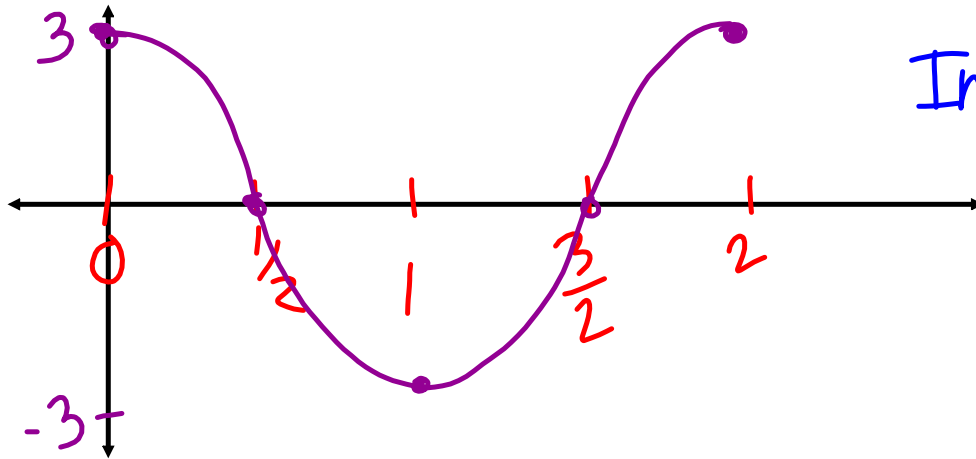


$$0 + \frac{3\pi}{2} = \frac{3\pi}{2} + \frac{3\pi}{2} = \frac{6\pi}{2} + \frac{3\pi}{2} = \frac{9\pi}{2} + \frac{3\pi}{2} = \frac{12\pi}{2}$$

Graph the following functions on the following intervals (Be sure to use 5 key points!)

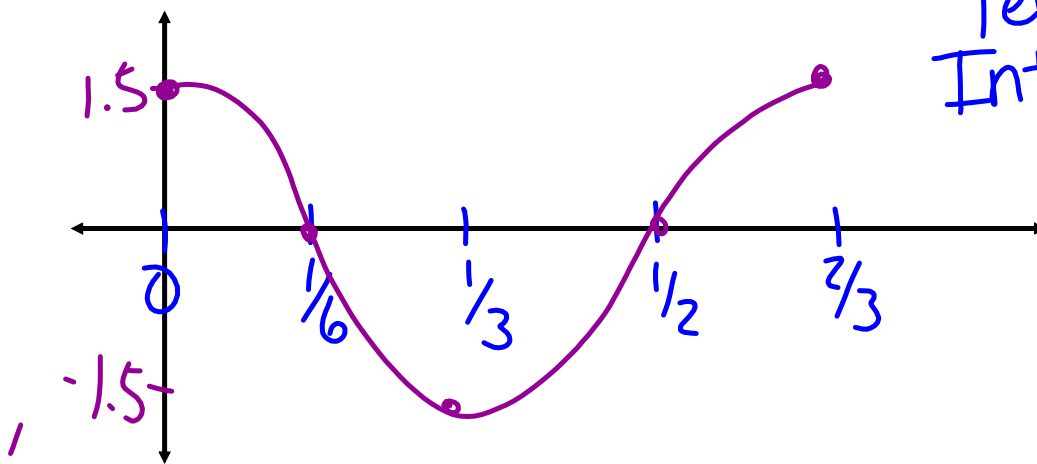
Ex. 10)  $f(x) = 3 \cos(\pi x)$

Amp: 3  
 Per:  $\frac{2\pi}{\pi} = 2$   
 Int:  $\frac{2}{4} = \frac{1}{2}$



Ex. 11)  $f(x) = 1.5 \cos(3\pi x)$

Amp: 1.5  
 Per:  $\frac{2}{3}$   
 Int:  $\frac{2}{3} \cdot \frac{1}{4} = \frac{2}{12} = \frac{1}{6}$



$$\textcircled{0} + \frac{1}{6} = \textcircled{\frac{1}{6}} + \frac{1}{6} = \textcircled{\frac{2}{6}} + \frac{1}{6} = \textcircled{\frac{3}{6}} + \frac{1}{6} = \textcircled{\frac{4}{6}}$$