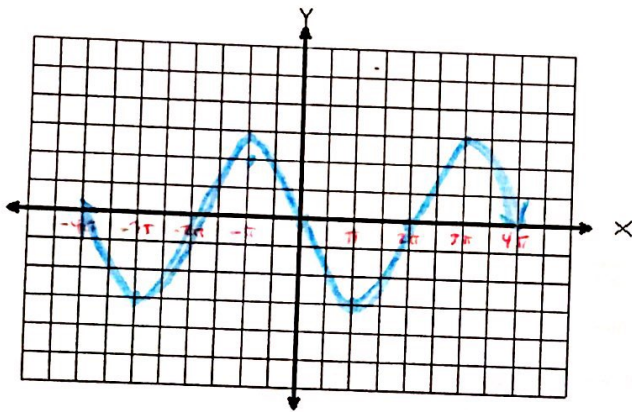


Graph the following on a one period interval. Find the amplitude/vertical stretch, period, phase shift, and vertical shift. Identify any asymptotes in the graph.

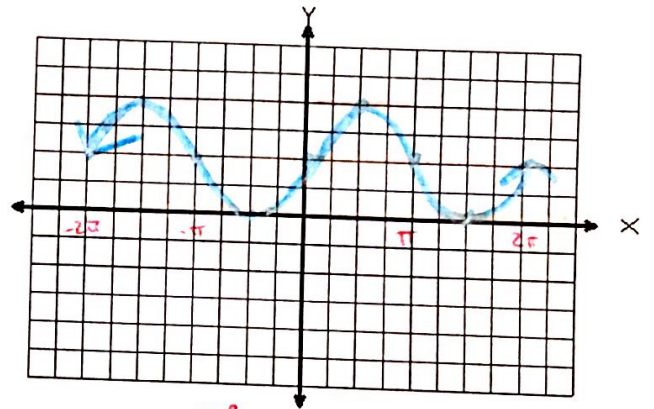
1.) $y = -3\sin\left(\frac{1}{2}x\right)$ Intervals: π
 Amplitude: 3 Vertical Shift: NA
 Period: 4π Phase Shift: NA

OTOBTO
OBOTTO



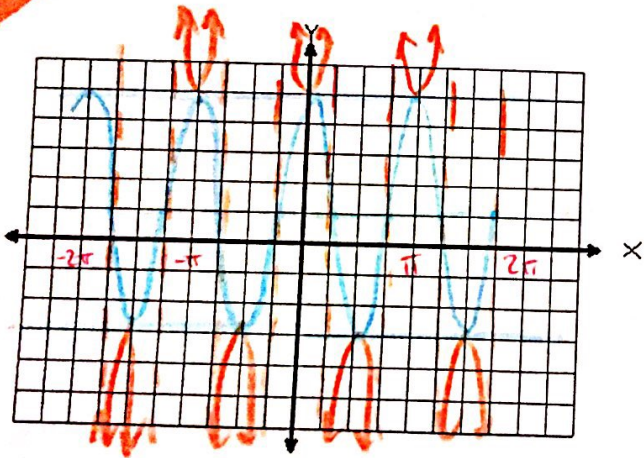
2.) $y = 2\cos\left(x - \frac{\pi}{2}\right) + 2$ Intervals: $\pi/2$
 Amplitude: 2 Vertical Shift: $\uparrow 2$
 Period: 2π Phase Shift: $\rightarrow \frac{\pi}{2}$

TUBOT



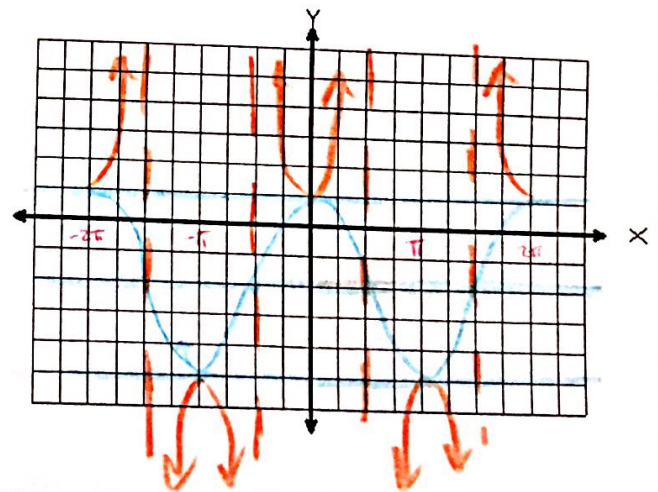
3.) $y = 4\csc\left(2x + \frac{\pi}{2}\right) + 1$ Intervals: $\pi/4$
 Amplitude: 4 Vertical Shift: 1
 Period: π Phase Shift: $-\pi/4$

~~Answer~~



4.) $y = -3\sec(x + \pi) - 2$ Intervals: $\pi/2$
 Amplitude: 3 Vertical Shift: $\downarrow 2$
 Period: 2π Phase Shift: $\leftarrow \pi$

~~Answer~~



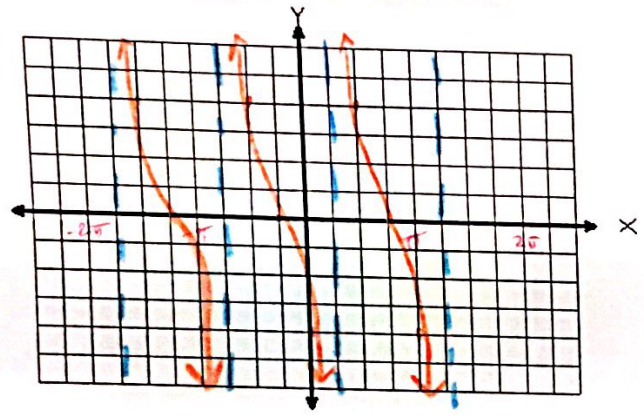
T=3

$y = -4 \tan\left(x + \frac{\pi}{4}\right)$ Intervals: $\frac{\pi}{4}$

Amplitude: 4 Vertical Shift: NA

Period: π Phase Shift: $-\frac{\pi}{4}$

Asymptotes: $x = \frac{\pi}{4} + \pi n$
 $x + \frac{\pi}{4} = \frac{\pi}{2}$
 $x = \frac{\pi}{4}$



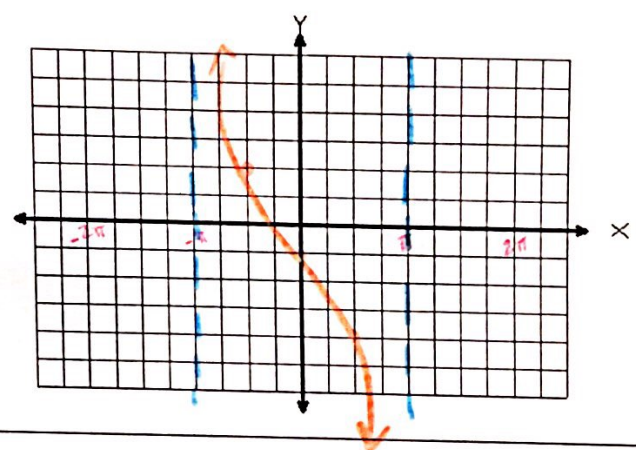
T=3

6.) $y = 3 \cot\left(\frac{1}{2}x + \frac{\pi}{2}\right) - 1$ Intervals: $\frac{\pi}{2}$

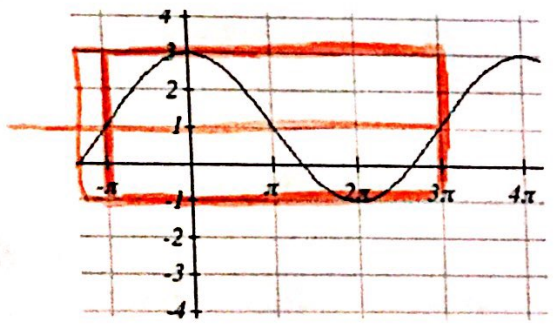
Amplitude: 3 Vertical Shift: $\downarrow 1$

Period: 2π Phase Shift: $-\pi$

Asymptotes: $x = -\pi + 2\pi n$

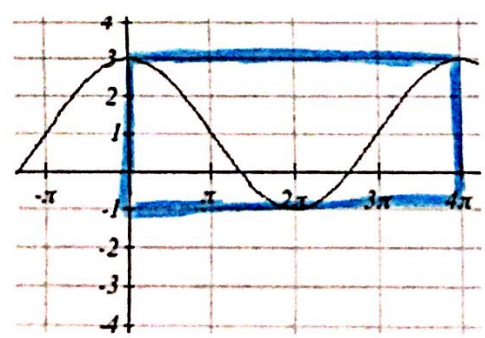


7.) Write a sine and cosine equation for the given graph. Box the period you used to write your equation.



$a = 2$ $b = \frac{1}{2}$
 $d = 1$
 P.S. $-\pi$

Sine: $y = 2 \sin\left(\frac{1}{2}(x + \pi)\right) + 1$



Cosine: $y = 2 \cos\left(\frac{1}{2}x\right) + 1$

Write a sine and cosine equation for the given graph. Box the period you used to write your equation.

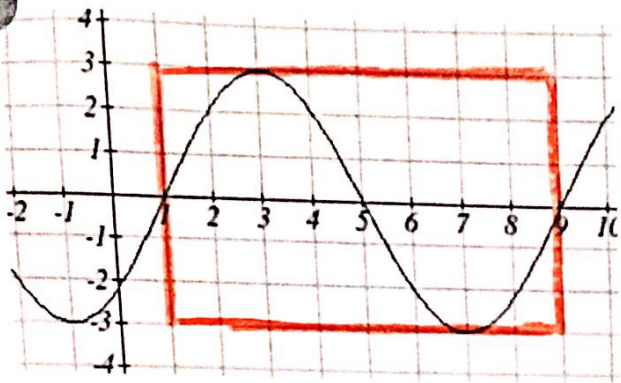
$$8 = \frac{2\pi}{b} \quad \frac{8b}{8} = \frac{2\pi}{8}$$

$$a = 3$$

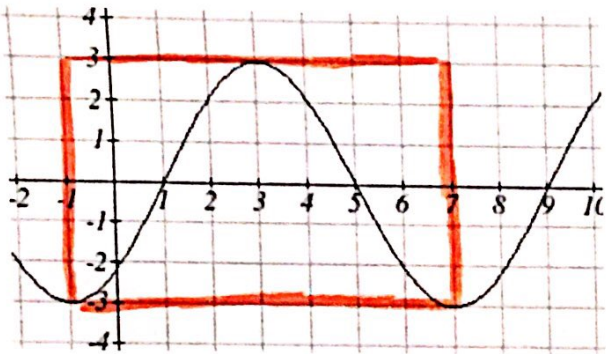
$$d = 0$$

$$P = 8 \quad (x-1)$$

$$b = \frac{\pi}{4}$$



Sine: $y = 3 \sin\left(\frac{\pi}{4}(x-1)\right)$



$$a = 3$$

$$d = 0$$

$$b = \frac{\pi}{4}$$

$$(x+1)$$

Cosine: $y = 3 \cos\left(\frac{\pi}{4}(x+1)\right)$

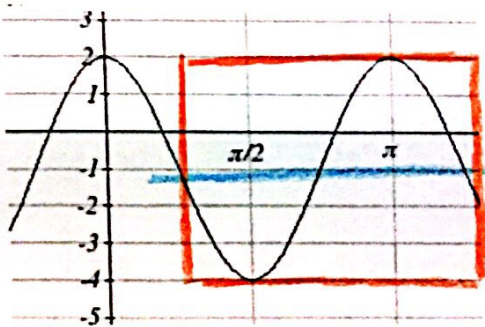
9.) Write a sine and cosine equation for the given graph. Box the period you used to write your equation.

$$a = 3$$

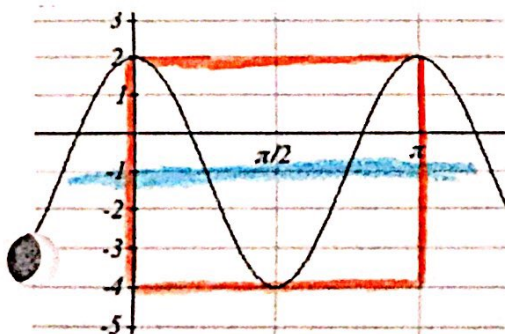
$$d = -1$$

$$P.S. \quad x = \frac{\pi}{4} \quad -\sin \theta$$

$$\pi = \frac{2\pi}{b} \quad b = 2$$



Sine: $y = -3 \sin\left(2\left(x - \frac{\pi}{4}\right)\right) - 1$



Cosine: $y = 3 \cos(2x) - 1$

$$\frac{7\pi}{6}x + \frac{7\pi}{2} = 0 \quad \frac{6}{7\pi} \cdot \frac{7\pi}{6}x = -\frac{7\pi}{2} \cdot \frac{6}{7\pi}$$

10.) Find the period and phase shift for each equation.

a.) $y = \sin\left(\frac{\pi}{6}x + \pi\right) - 3$

$$P = \frac{2\pi}{\frac{\pi}{6}} = 2\pi \cdot \frac{6}{\pi} = 12$$

$$P.S. \frac{6}{\pi} \cdot \frac{\pi}{6}x = -\pi \cdot \frac{6}{\pi} \quad x = -6$$

b.) $y = \sec\left(\frac{7\pi}{6}x + \frac{7\pi}{2}\right) + 6$

$$P = \frac{2\pi}{\frac{7\pi}{6}} = 2\pi \cdot \frac{6}{7\pi} = \frac{12}{7}$$

$$P.S. \frac{6}{7\pi} \cdot \frac{7\pi}{6}x + \frac{7\pi}{2} = 0 \quad \frac{6}{7\pi} \cdot \frac{7\pi}{6}x = -\frac{7\pi}{2} \cdot \frac{6}{7\pi}$$

c.) $y = \tan\left(\frac{\pi}{3}x + \frac{\pi}{2}\right) - 1$

$$\frac{\pi}{\pi/3} \quad \pi \cdot \frac{3}{\pi} = 3$$

$$\frac{3}{\pi} \cdot \frac{\pi}{3}x = -\frac{\pi}{2} \cdot \frac{3}{\pi} \quad x = -3/2$$

d.) $y = \cot(3x + \pi) - 1$

$$P = \frac{\pi}{3}$$

$$3x + \pi = 0 \quad 3x = -\pi \quad x = -\pi/3$$

Use the information to answer each question.

Suppose you are on the beach at Fort Myers, Florida. At 3:00pm, at high tide, you find that the depth of water at the end of a pier is 14 feet. At 9:00 pm, at low tide, the depth of the water is 4 feet. Assume that the depth varies sinusoidally with time.

- a.) Find an equation expressing the depth as a function of time that has elapsed since 12:00 am.
- b.) Predict the depth of the water at 11:30 pm.
- c.) You plan to take out your boat. It is recommended the water depth be at least 8 feet. Approximately what intervals of time can you take your boat out?

$$(15, 14)$$

$$(21, 4)$$

$$d = 9$$

$$a = 5$$

$$P = 12 \text{ hours}$$

$$12 = \frac{2\pi}{b}$$

$$b = \pi/6$$

$$a.) y = 5 \cos\left(\frac{\pi}{6}(x-15)\right) + 9$$

$$b.) x = 23.5 \rightarrow 7.7059$$

c.) Midnight \rightarrow 6:22 AM
 11:37 \rightarrow 6:22 pm
 11:37 \rightarrow Next day

6.38
 11.62 18.38
 40 23.62