

4.4-4.5 Review WS — Solutions

Accurately graph 2 cycles. Identify vertical asymptotes, starting point and period.

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

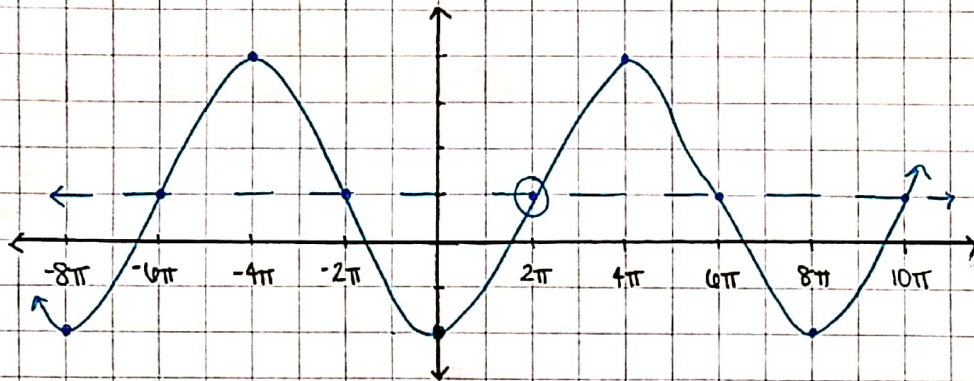
* period: $2\pi \div \frac{1}{4} = 8\pi$

phase shift: $\frac{1}{4}x - \frac{\pi}{2} = 0$
 $\frac{1}{4}x = \frac{\pi}{2}$
 $x = 2\pi$ right

crit. pts: $\frac{8\pi}{4} = 2\pi$

amp: 3

axis: $y = 1$



* st. pt: $(2\pi, 1)$

* vert. asym: none

2. $y = 2 \tan \left(2x - \frac{\pi}{4} \right) - 1$

* period: $\frac{\pi}{2}$

* asym:

$2x - \frac{\pi}{4} = -\frac{\pi}{2}$
 $2x = -\frac{\pi}{4}$
 $x = -\frac{\pi}{8}$

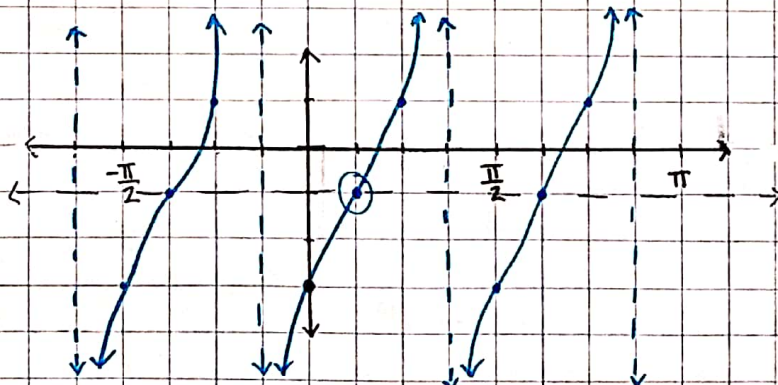
$2x - \frac{\pi}{4} = \frac{\pi}{2}$
 $2x = \frac{3\pi}{4}$
 $x = \frac{3\pi}{8}$

crit. pts: $\frac{\pi}{2} \div 4$

$\frac{\pi}{2} \cdot \frac{1}{4}$
 $\frac{\pi}{8}$

amp: 2

axis: $y = -1$



* st. pt: $\left(\frac{\pi}{8}, -1 \right)$

3. $y = \sec(x + \pi) - 3$

* period: 2π

amp: 1

axis: $y = -3$

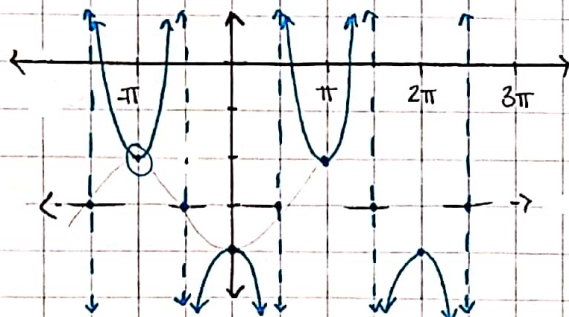
phase shift: $x + \pi = 0$

$x = -\pi$

left

crit. pts: $\frac{2\pi}{4} = \frac{\pi}{2}$

* st. pt: $(-\pi, -2)$



4. $y = -2\csc\left(\frac{x}{3}\right) + 3$

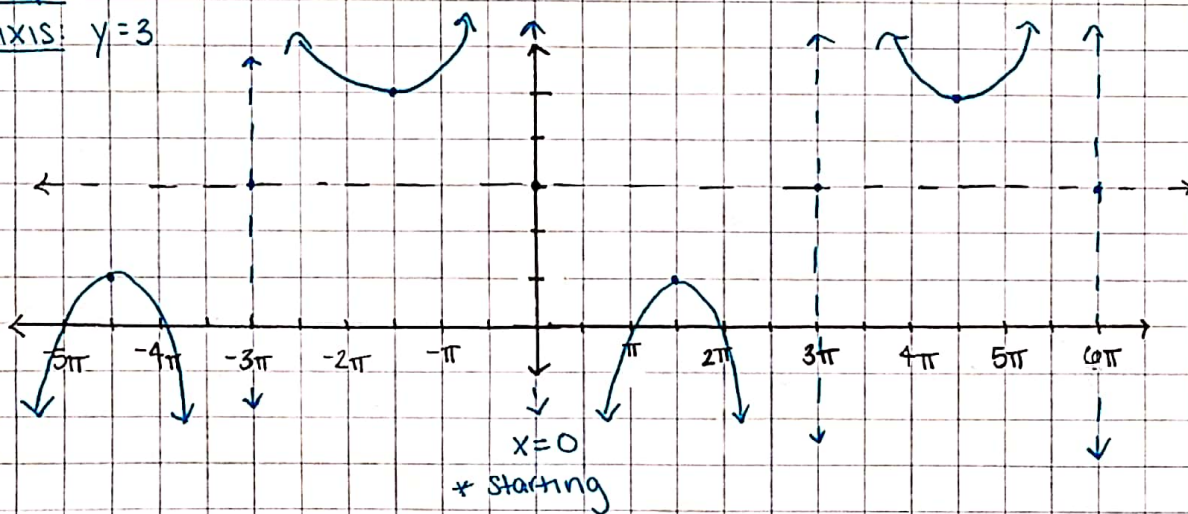
* period: $\frac{2\pi}{\frac{1}{3}} = 6\pi$

phase shift: none

crit. pts: $\frac{6\pi}{4} = \frac{3\pi}{2}$

amp: 2

axis: $y = 3$



5. $y = \cot\left(x + \frac{\pi}{4}\right) - 4$

* period: π
amp: 1
axis: $y = -4$

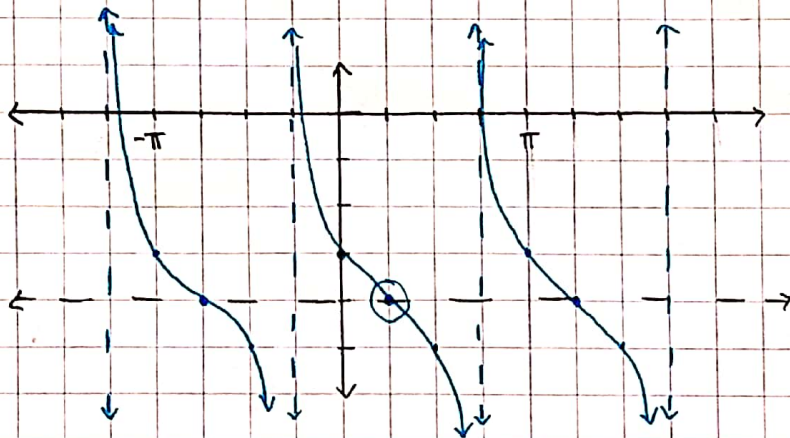
* asym:

$$x + \frac{\pi}{4} = 0 \quad x + \frac{\pi}{4} = \pi$$

$$x = -\frac{\pi}{4} \quad x = \frac{3\pi}{4}$$

crit. pts: $\frac{2\pi}{4} = \frac{\pi}{2}$

* st. pt.: $\left(\frac{\pi}{4}, -4\right)$



6. $y = -2 \cos\left(\frac{1}{2}x - \pi\right) + 1$

* period: $2\pi \div \frac{1}{2} = 4\pi$

phase shift:

$$\frac{1}{2}x - \pi = 0$$

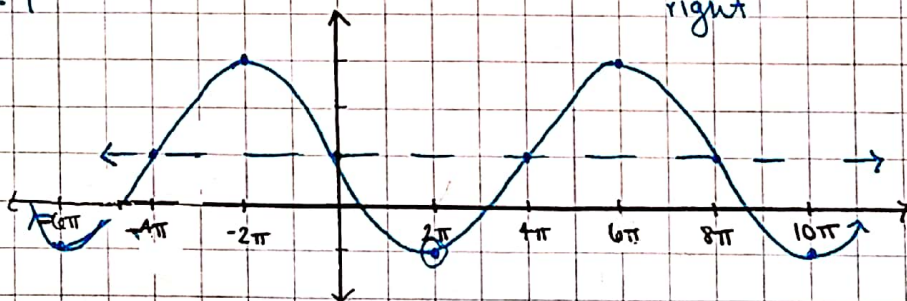
$$\frac{1}{2}x = \pi$$

$$x = 2\pi \text{ right}$$

crit. pts: $\frac{4\pi}{2} = 2\pi$

amp: 2
axis: $y = 1$

* st. pt.: $(2\pi, -1)$



Find two equations for each of the following graphs
(see WS for graph)

7. period: 4π
amp: 2
axis: $y=1$

$$\frac{2\pi}{b} = 4\pi$$

$$2\pi = 4\pi b$$

$$\frac{1}{2} = b$$

$-c(\sin)$: $-c \div \frac{1}{2} = -\frac{\pi}{2}$
 $\frac{1}{2} \cdot -2c = -\frac{\pi}{2} \cdot \frac{1}{-2}$
 $c = \frac{\pi}{4}$

$$y = 2 \sin\left(\frac{1}{2}x + \frac{\pi}{4}\right) + 1$$

$$y = 2 \cos\left(\frac{1}{2}x - \frac{\pi}{4}\right) + 1$$

$-c(\cos)$: $-c \div \frac{1}{2} = \frac{\pi}{2}$
 $-2c = \frac{\pi}{2}$
 $c = -\frac{\pi}{4}$

8. period: 2π
amp: 2
axis: $y=-1$

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

$$\pi = 2\pi b$$

$$\frac{1}{2} = b$$

$-c(\tan)$: $\pi = -c \div \frac{1}{2}$
 $\pi = -2c$
 $-\frac{\pi}{2} = c$

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

$$y = 2 \cot\left(\frac{1}{2}x - \pi\right) - 1$$

$-c(\cot)$: $2\pi = -c \div \frac{1}{2}$
 $2\pi = -2c$
 $-\pi = c$

9. period: 2π
amp: 3
axis: $y=-2$

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

$$2\pi = 2\pi b$$

$$1 = b$$

$-c(\csc)$: $-\frac{3\pi}{4} = -c$
 $\frac{3\pi}{4} = c$

$$y = 3 \csc\left(x + \frac{3\pi}{4}\right) - 2$$

$$y = 3 \sec\left(x + \frac{\pi}{4}\right) - 2$$

$-c(\sec)$: $-\frac{\pi}{4} = -c$
 $\frac{\pi}{4} = c$

10. Given $y = 5 \sin \left(\frac{1}{4}x - \frac{\pi}{2} \right) - 7$ what is the frequency?

$$\text{period: } \frac{2\pi}{\frac{1}{4}} \\ \frac{2\pi \cdot 4}{8\pi}$$

$$\text{freq: } \frac{1}{8\pi}$$

11. What are the equations for the asymptotes of

a. $y = 3 \cot \left(2x + \frac{\pi}{6} \right) - 4$

$$2x + \frac{\pi}{6} = 0$$

$$2x + \frac{\pi}{6} = \pi$$

$$\frac{1}{2} \cdot 2x = -\frac{\pi}{6} \cdot \frac{1}{2}$$

$$\frac{1}{2} \cdot 2x = \frac{5\pi}{6} \cdot \frac{1}{2}$$

$$x = -\frac{\pi}{12}$$

$$x = \frac{5\pi}{12}$$

b. $y = \tan \left(\frac{x}{3} - \frac{\pi}{5} \right) - 1$

$$\frac{x}{3} - \frac{\pi}{5} = \frac{\pi}{2}$$

$$\frac{x}{3} - \frac{\pi}{5} = -\frac{\pi}{2}$$

$$\frac{x}{3} = \frac{5\pi}{10} + \frac{2\pi}{10}$$

$$\frac{x}{3} = -\frac{5\pi}{10} + \frac{2\pi}{10}$$

$$3 \cdot \frac{x}{3} = \frac{7\pi}{10} \cdot 3$$

$$3 \cdot \frac{x}{3} = -\frac{3\pi}{10} \cdot 3$$

$$x = \frac{21\pi}{10}$$

$$x = -\frac{9\pi}{10}$$

Review WS

Complete the following worksheet on a separate sheet of paper.

Accurately graph at least 2 cycles of the following graphs. In addition identify the vertical asymptotes, starting point and period.

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

2. $y = 2 \tan\left(2x - \frac{\pi}{4}\right) - 1$

3. $y = \sec(x + \pi) - 3$

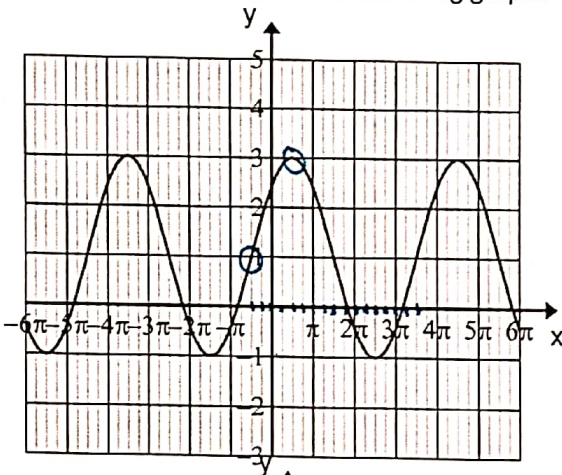
4. $y = -2 \csc\left(\frac{x}{3}\right) + 3$

5. $y = 2 \cot\left(x + \frac{\pi}{4}\right) - 4$

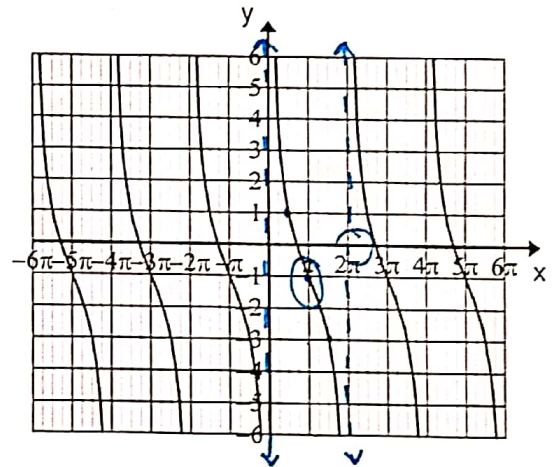
6. $y = -2 \cos\left(\frac{1}{2}x - \pi\right) + 1$

Find two equations for each of the following graphs

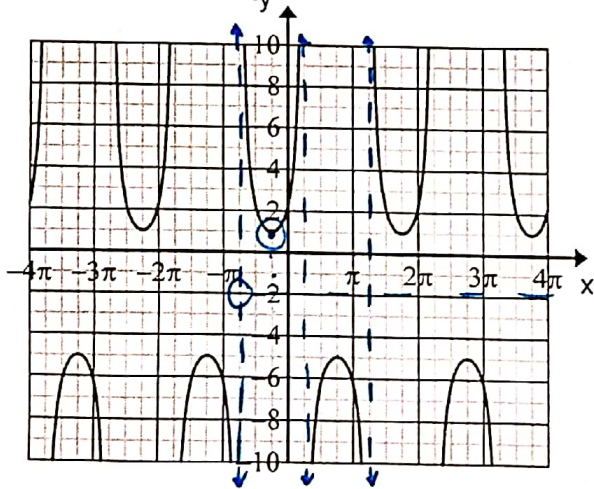
7.



8.



9.



10. Given $y = 5 \sin\left(\frac{1}{4}x - \frac{\pi}{2}\right) - 7$ what is the frequency?

11. What are the equations for the asymptotes of

a. $y = 3 \cot\left(2x + \frac{\pi}{6}\right) - 4$

b. $y = \tan\left(\frac{x}{3} - \frac{\pi}{5}\right) - 1$