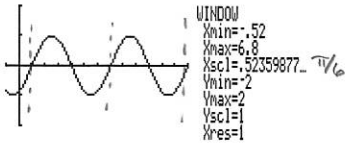
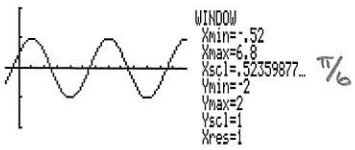
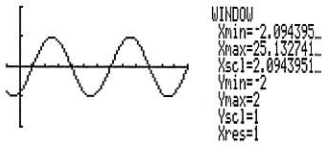
Precalculus
4.5 – 4.8 Test Review B

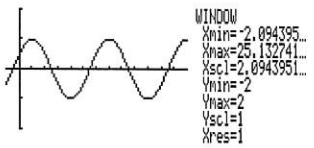
Name Key
Period _____ Date _____

1. Which is the graph of $y=\sin\left(2x-\frac{\pi}{3}\right)$

A. 

B. 

C. 

D. 

E. None of these.

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

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

Phase shift

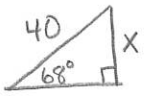
$2x - \pi/3 = 0$

$2x = \pi/3$

$x = \pi/6$

2. A 40-foot extension ladder leans against the side of a building. Find the distance up the side of the building that ladder rests if the angle of elevation of the ladder is 68°.

a. 35 feet b. 36 feet c. 37 feet d. 38 feet e. None of these



$\sin 68^\circ = \frac{x}{40}$

$x = 40 \sin 68^\circ$

$x = 37$ feet

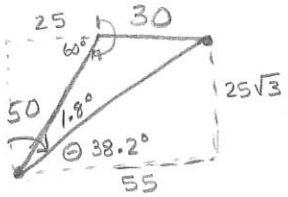
3. A ship leaves port and travels due west for 30 miles, then changes course to a bearing 210° and travels 50 miles further. Find the bearing back to the port of departure.

a. 75.3° b. 38.2° c. 51.8° d. 16° e. None of these

this won't be on test

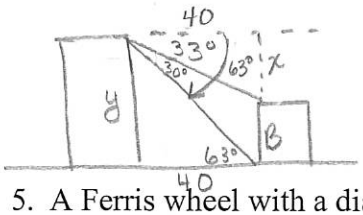
$\tan^{-1}\left(\frac{25\sqrt{3}}{55}\right) = \theta$

$\theta = 38.2^\circ$



4. The angle of depression from the top of a building to the top of another building is found to be 33°. The angle of depression to the bottom of the second building was found to be 63°. The buildings are 40 feet apart. How tall is the second building?

a. $\frac{40\sqrt{3}}{3}$ *ft* b. 256.21 *ft* c. 3019.31 *ft* d. 52.53 *ft* e. None of these



$\tan 63^\circ = \frac{y}{40}$

$y = 40 \tan 63^\circ$

$y = 78.5$

$\tan 33^\circ = \frac{x}{50}$

$x = 40 \tan 33^\circ$

$x = 25.98$

$B = Y - X$

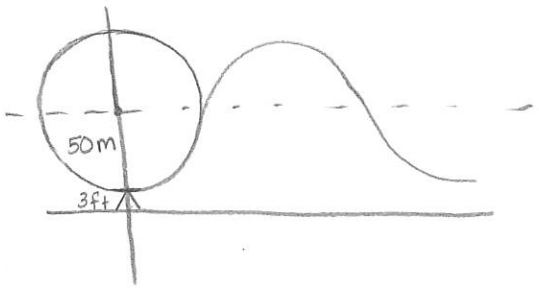
$B = 78.5 - 25.98$

$B = 52.52$ ft

5. A Ferris wheel with a diameter of 100 meters spins at a rate of $\frac{1}{6}$ rpm. The bottom of the wheel is 3 meters off the ground. Which is the equation that models the height of a rider on this Ferris wheel at time, *t*, minutes?

a. $h(t) = 103 + 100\sin\left(\frac{\pi}{3}t\right)$ b. $h(t) = 53 + 50\sin\left(\frac{\pi}{3}t\right)$ c. $53 + 50\sin\left(\frac{\pi}{12}t\right)$

d. $h(t) = 50 + 50\sin(12\pi t)$ e. $h(t) = 53 + 50\sin(12\pi t)$



$\frac{1}{6}$ $\frac{\text{rev}}{\text{min}}$

period = 6 min

$6 = \frac{2\pi}{b}$

$b = \pi/3$

$\frac{2\pi}{2} = \pi$ $\frac{2\pi}{3} = \frac{2\pi}{3}$

6. Find the period of $y = 3\cos(2x-1) - 4\sin(3x-2)$.

a. $\frac{\pi}{2}$ b. π c. $\frac{5\pi}{3}$ d. $\frac{3\pi}{2}$ e. 2π

$\pi, 2\pi, 3\pi, 4\pi, 5\pi$

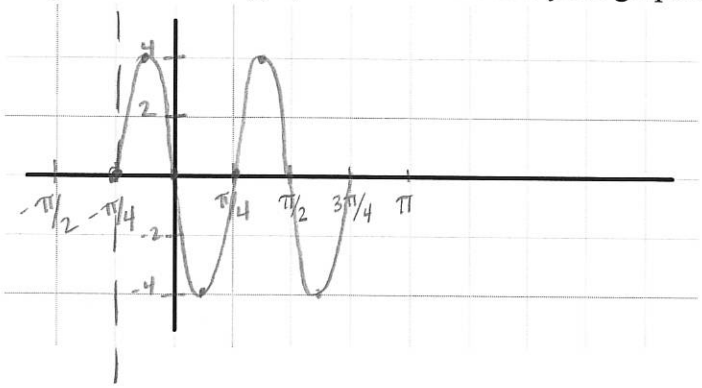
$\frac{2\pi}{3}, \frac{4\pi}{3}, \frac{6\pi}{3}$

7. What is the envelope/damping function of $y = 2^{-x}\cos(e^{-x}x + \pi)$.

a. 2^x b. 2^{-x} c. e^x d. e^{-x} e. None of these

SHOW WORK for full credit

8. Graph the following. (Make sure to scale your graph clearly): $y = 4\sin(4x+\pi)$



amp: 4

period: $\frac{2\pi}{4} = \frac{\pi}{2}$

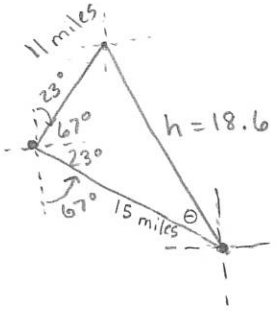
phase shift

$4x + \pi = 0$

$4x = -\pi$

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

9. Two ships A and B leave port at the same time with ship A sailing in the direction N23°E at the speed of 11 mph, and ship B sailing in the direction S67°E at 15 mph. How far apart are the two ships and what is the bearing from ship B to ship A one hour later?



$11^2 + 15^2 = h^2$

$\sqrt{346} = h$

$h = 18.6$

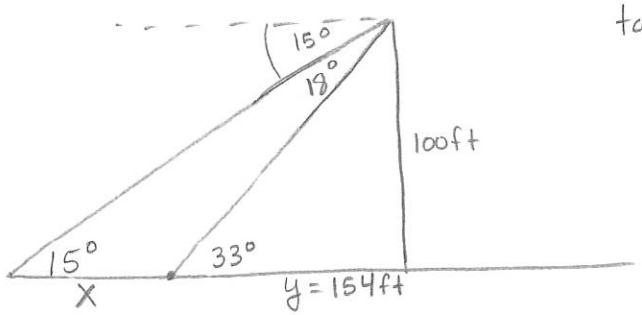
$\tan\theta = \frac{11}{15}$

$\tan^{-1}(11/15) = \theta$ $\theta = 36.25°$

Bearing

N 30.7°E

10. From the top of a 100 ft building a man observes a car moving toward him. If the angle of depression of the car changes from 15° to 33° during the period of observation, how far does the car travel?



$\tan 33° = \frac{100}{y}$

$y = \frac{100}{\tan 33°}$

$y = 154$ ft

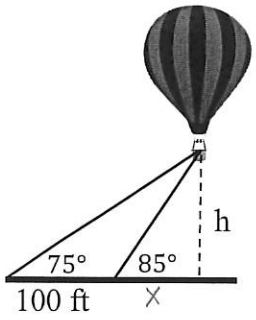
$\tan 15° = \frac{100}{x+154}$

$x + 154 = \frac{100}{\tan 15°}$

$x + 154 = 373.2$

$X = 219.2$ ft

11. Two wires tether a balloon to the ground, as shown. How high is the balloon above the ground?



$\tan 75° = \frac{h}{100+x}$ $\quad \tan 85° = \frac{h}{x}$

$\tan 75°(100+x) = h$ $\quad x \tan 85° = h$

$\tan 75°(100+x) = x \tan 85°$

$373.2 + 3.73x = 11.4x$

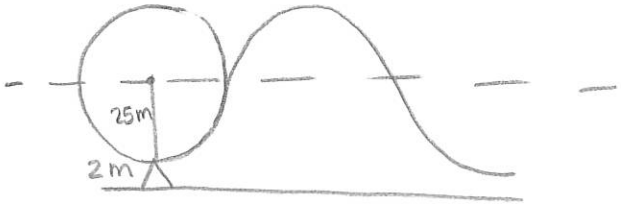
$373.2 = 7.67x$

$x = 48.7$ ft

$(48.7)(\tan 85°) = h$

$h = 556.2$ ft

12. A Ferris wheel with a dimeter of 50 meters spins at a rate of ¼ rpm. The bottom of the wheel is 2 meters off the ground. Write the equation that models the height of the rider.



$y = -25 \cos \frac{\pi}{2} t + 27$

$\frac{1}{4} \frac{rev}{min}$

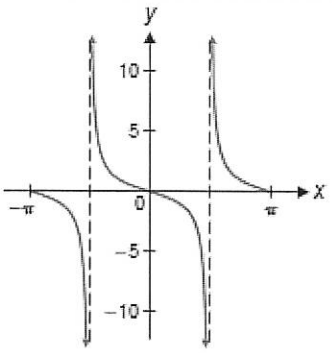
Period = 4 min

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

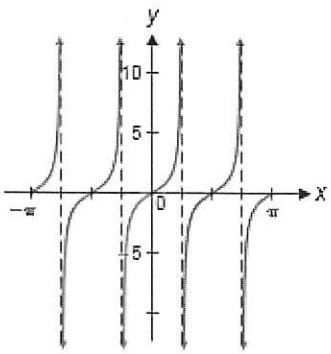
$b = \frac{\pi}{2}$

13. (A) Match each function to its graph and discuss how the graph compares to the graph of $y = \tan x$ or $y = \cot x$.

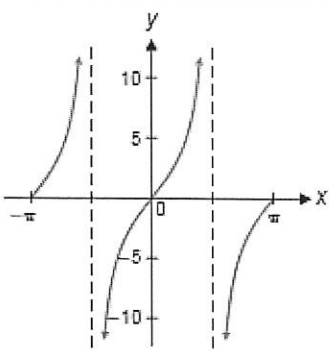
(1) $y = 4 \tan x$ (C) $\quad$ (2) $y = \tan 2x$ (B) $\quad$ (3) $y = \cot(x - \pi/2)$ (A)



(a) 3



(b) 2



(c) 1

14. Find the period and phase shift for $y = \cot\left(2x + \frac{\pi}{2}\right)$

period: $\frac{\pi}{2}$ $\quad 2x + \frac{\pi}{2} = 0$

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

$x = -\pi/4$ $\quad$ Left $\pi/4$

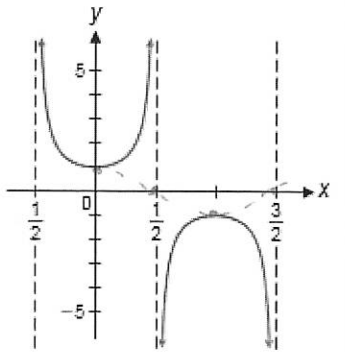
15. Find the period and phase shift for $y = 2 \csc\left(\frac{\pi x}{2} - \pi\right)$

period: $\frac{2\pi}{\frac{\pi}{2}} = 4$ $\quad \frac{\pi x}{2} - \pi = 0$

$\frac{\pi}{2} x = \pi$ $\quad x = 2$ phase shift right 2

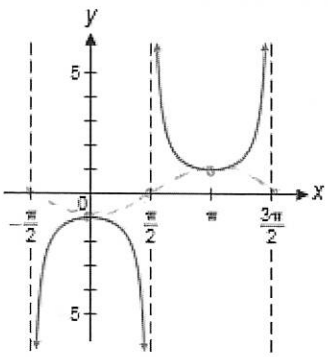
16. (A) Match each function to its graph, and discuss how the graph compares to the graph of $y = \csc x$ or $y = \sec x$.

(C) (1) $y = \frac{1}{2}\csc x$ (2) $y = \sec \pi x$ (A) (3) $y = \csc(x - \pi/2)$ (B)

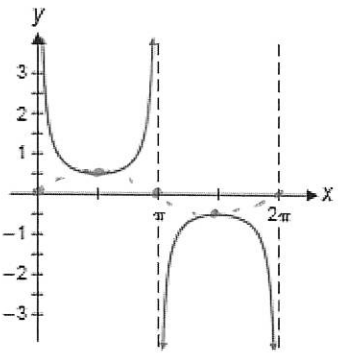


(a)

(2)



(b) (3)



(c) (1)

17. The displacement of a mass suspended by a spring is modeled by the function $y = 10 \sin 4\pi t$ where y is measured in inches and t in seconds.

a) Find the amplitude and period of the motion of the mass. amp: 10 period: $\frac{2\pi}{4\pi} = \frac{1}{2}$

b) Sketch the graph of the displacement of the mass. starting from equillibrium