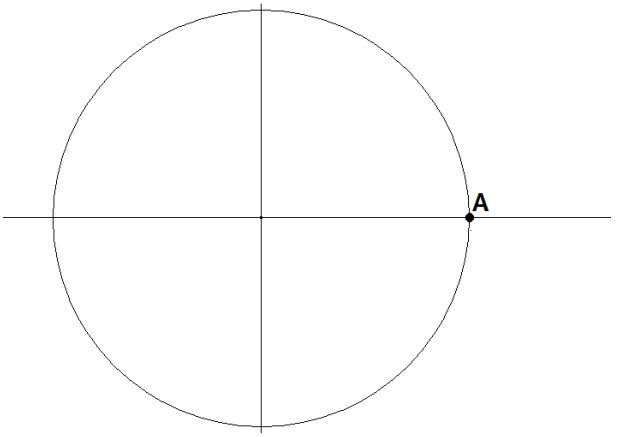
Honors PreCalc – Chapter 4 Homework Packet

1) The Ferris wheel shown below goes underground and rotates counterclockwise. The horizontal line in the diagram represents the ground (where the height is 0). The Ferris wheel has a diameter of 2 kilometers and it takes 360 seconds for it to travel one rotation. You board the Ferris wheel at point *A* and stay on the ride for 720 seconds. Draw a graph to represent your height *y* from the ground as a function of time *x*.



a) What will be your height off the ground after 90 seconds?

b) What will be your height off the ground after 45 seconds?

c) What will be your height off the ground after 60 seconds?

d) What will be your height off the ground after 150 seconds?

e) What will be your height off the ground after 270 seconds?

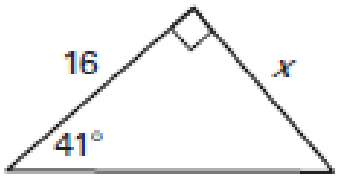
f) What will be your height off the ground after 450 seconds?

g) What will be your height off the ground after 13 seconds?

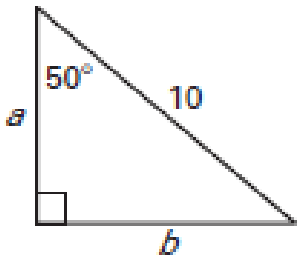
h) What is the equation for the graph?

2) Solve for the variable(s).

a)



b)



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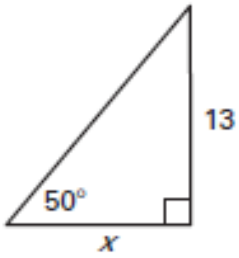
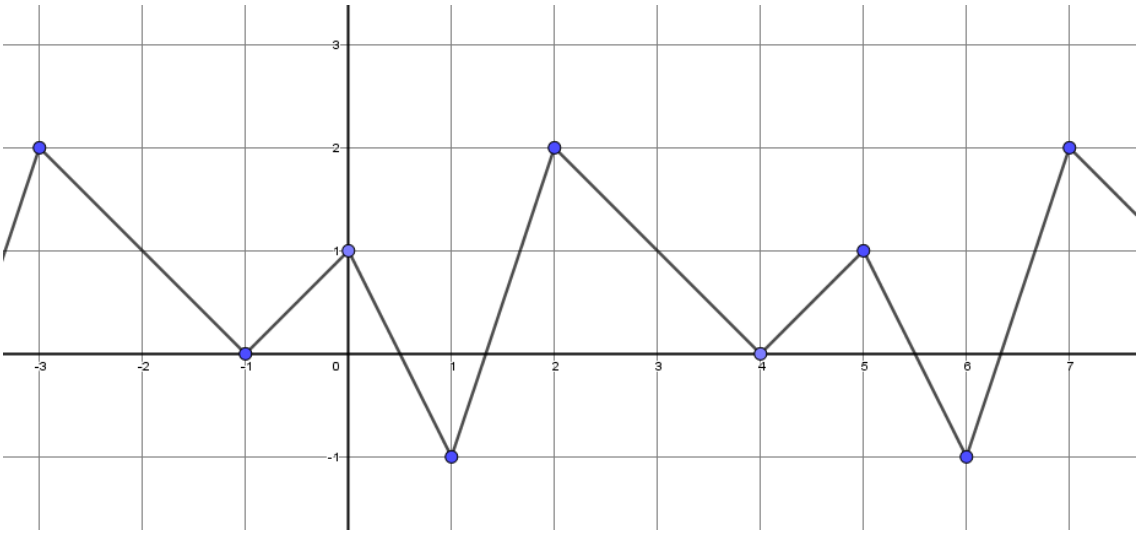


3) Use the periodic function below to answer the following questions.



a) What is the period?

b) What is the amplitude?

c) What is $f(918)$?

d) What is $f(-306)$?

4) Evaluate. Leave as an exact answer.

a) $\tan\frac{11\pi}{3}$

b) $\sin\frac{-2\pi}{3}$

c) $\cot 7\pi$

d) $\csc(-210°)$

e) $\cos 405°$

f) $\sec\frac{23\pi}{6}$

g) $\cot 315°$

h) $\sin 45°\cos 60°$

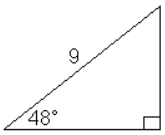
5) Evaluate. Round to the nearest hundredth.

a) $\sec 311°$ b) $\tan 52°$ c) $\sin 4$ d) $\cot \frac{11\pi}{9}$

6) Fill in the blank with an angle measure that makes the statement true.

a) $\sin 30° = \cos$_____ b) $\sec 85° = \csc$____ c) $\tan 135° = \cot$_____

7) Determine the area and perimeter of the triangle.



8) From the top of a tower, the angle of depression to a stake on the ground is 72°. The top of the tower is 80 feet above the ground. How far is the stake from the top of the tower?

9) What quadrant must the angle be in if the following are true?

a) $\tan\theta > 0$, $\sec\theta < 0$

b) $\sin\theta > 0$, $\cos\theta < 0$

c) $\csc\theta < 0$, $\cot\theta < 0$

d) $\tan\theta > 0$, $\cos\theta < 0$

10) The terminal side of an angle passes through the point (-3, 4). Determine the value of the six trig functions of the angle.

11) A wheel has a diameter of 15 inches and completes 3 revolutions per second. Determine its speed in miles per hour.

12) Complete the table.

Feature	$y = \sin x$	$y = \cos x$	$y = \tan x$	$y = \cot x$	$y = \sec x$	$y = \csc x$
Domain						
Vertical Asymptotes						
Range						
x-intercepts						
y-intercept						
Period						
Amplitude						
Even or Odd						
Symmetry						

13) Graph the parent functions of $y = \cot x$ and $y = \csc x$.

14) Graph two periods of the function.

a) $y = -5.2\cos\frac{\pi}{2}(x+4)$

b) $f(x) = 3 - 1.5\sin\left(\frac{\pi}{4}x - \frac{3\pi}{2}\right)$

c) $y = -0.5\sin\left(\frac{\theta}{2} + 90°\right) + 1.4$

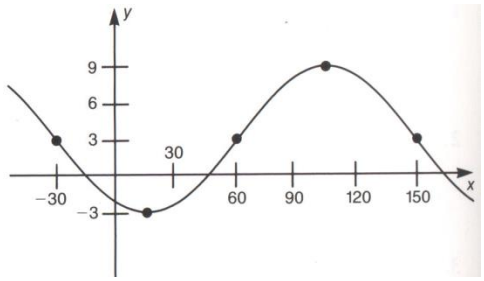
d) $y = \tan(2x - 70°)$

e) $f(\theta) = \frac{1}{4}\cos\left(2\pi\theta + 5\pi\right) + \frac{1}{3}$

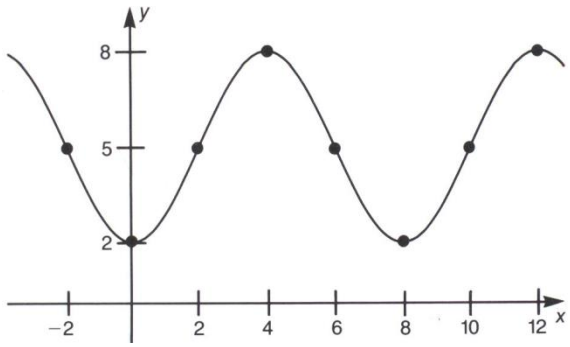
f) $p(t) = -4\sec(-t)$ **(in degrees)**

15) Write one sine and one cosine equation for each function. Note: graph (a) is measured in degrees and graph (b) is measured in radians.

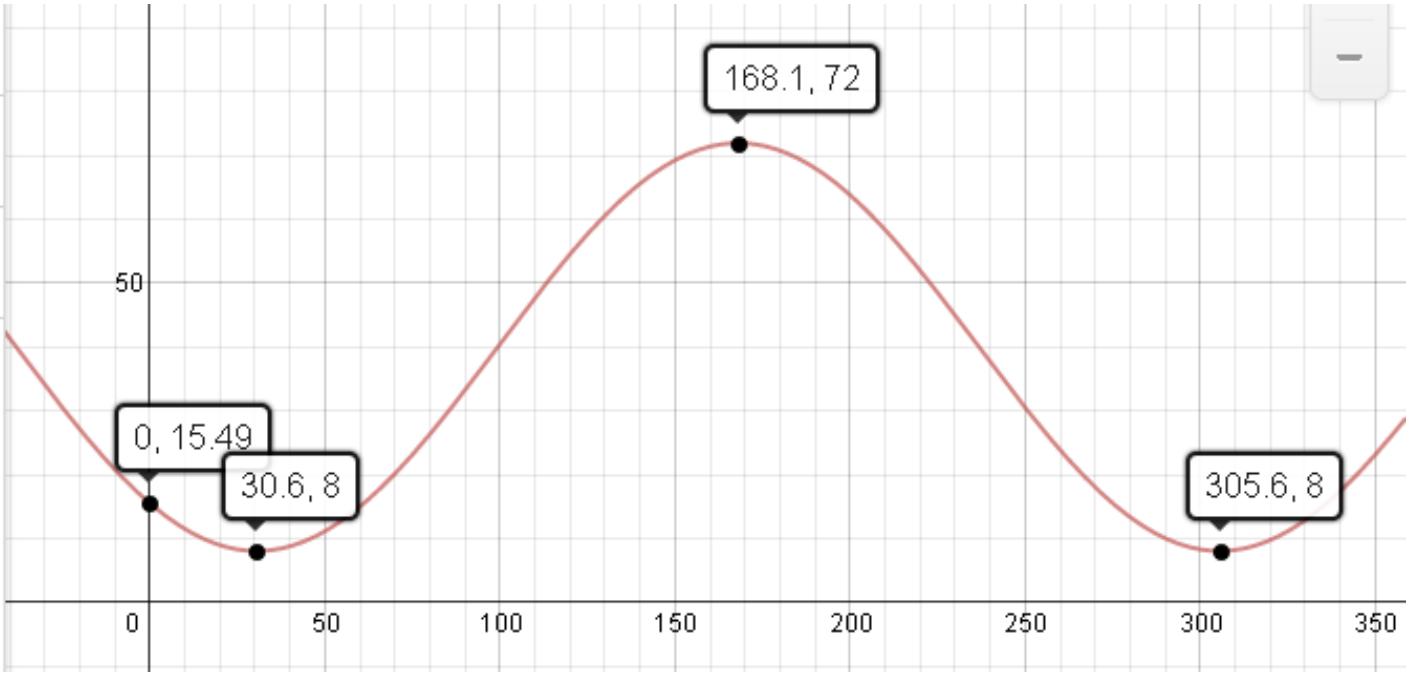
(a)



(b)



16) Stephanie rides a Ferris wheel and her height above the ground as a function of time is graphed below. The x-axis is measured in seconds and the y-axis is measured in feet. List all of the information you know about the Ferris wheel that she was riding. Be as specific as possible.



17) When a river flows into an ocean, the depth of the river varies near its mouth as a result of tides. Information about this change in depth is critical for safety. The following table gives the depth (in feet) of the Thames River in London for a certain time period.

a) Graph the points from the table on a coordinate plane. Let y = depth (in feet) and let x = time (in hours). Let $x = 0$ represent 12:00 A.M. Connect the points with a smooth curve.

b) Determine an equation for the graph.

c) If a ship requires at least 24 feet of water to navigate the Thames River safely, use your graph to estimate the time interval(s) when travel is *not* safe from 12:00 A.M to 12:00 A.M. the next day.

Time	Depth
3:00 A.M	18
4:30 A.M.	26
6:00 A.M.	34
7:30 A.M	26
9:00 A.M.	18
10:30 A.M.	26
12:00 P.M.	34
1:30 P.M.	26
3:00 P.M.	18
4:30 P.M.	26
6:00 P.M	34
7:30 P.M.	26
9:00 P.M.	18
10:30 P.M.	26
12:00 A.M.	34

18) Determine the exact value in radians.

a) $\sin^{-1}\left(\frac{-\sqrt{3}}{2}\right)$ b) $\tan^{-1}\left(\frac{\sqrt{3}}{3}\right)$ c) $\operatorname{arccot}(-1)$ d) $\operatorname{arcsec}(2)$

e) $\arccos(0)$ f) $\csc^{-1}(-\sqrt{2})$ g) $\arctan(\sqrt{3})$ h) $\sec^{-1}(-1)$

19) Determine the exact value in degrees.

a) $\arccos\left(\frac{\sqrt{2}}{2}\right)$ b) $\tan^{-1}(0)$ c) $\operatorname{arccsc}(2)$ d) $\sec^{-1}\left(\frac{2\sqrt{3}}{3}\right)$

20) In each equation below, circle the angle measure and put a square around the trigonometric ratio.

a) $\sin 45° = \frac{\sqrt{2}}{2}$ b) $\cos\frac{5\pi}{6} = \frac{-\sqrt{3}}{2}$ c) $\arctan(1) = \frac{\pi}{4}$

d) $\csc^{-1}(\frac{2\sqrt{3}}{3}) = \frac{\pi}{3}$ e) $\sec^{-1}(a) = b$ f) $\cot(z) = w$

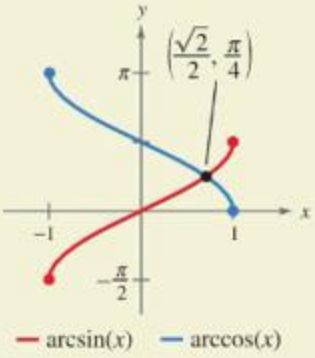
21) Fill out the chart below.

	Domain	Range
$y = \cos^{-1} x$		
$f(x) = \arcsin x$		
$g(x) = \operatorname{arccot} x$		

22) Use your calculator to estimate each (in degrees).

a) $\sin^{-1}(0.42)$ b) $\arctan(-2.3)$ c) $\csc^{-1}\left(\frac{5}{2}\right)$

23) Use the figure to determine the value(s) of x for which each statement is true.

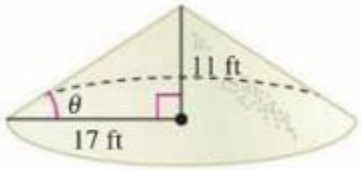


(a) $\arcsin x < \arccos x$

(b) $\arcsin x = \arccos x$

(c) $\arcsin x > \arccos x$

24) **Granular Angle of Repose** Different types of granular substances naturally settle at different angles when stored in cone-shaped piles. This angle θ is called the *angle of repose* (see figure). When rock salt is stored in a cone-shaped pile 11 feet high, the diameter of the pile's base is about 34 feet. *(Source: Bulk-Store Structures, Inc.)*



(a) Find the angle of repose for rock salt.

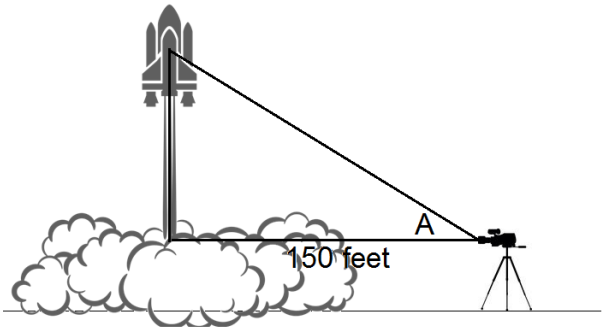
(b) How tall is a pile of rock salt that has a base diameter of 40 feet?

25) **Granular Angle of Repose** When whole corn is stored in a cone-shaped pile 20 feet high, the diameter of the pile's base is about 82 feet.

(a) Find the angle of repose for whole corn.

(b) How tall is a pile of corn that has a base diameter of 100 feet?

26) A television camera sits 5 feet off the ground and is filming a space shuttle launch. The camera is 150 feet from the shuttle. Let *h* represent the height off the ground of the center of the shuttle. Write a function to represent the angle of the camera *A* as a function of *h*.



27) Determine the exact value in radians.

a) $\sin^{-1}\left(\frac{1}{2}\right)$ b) $\tan^{-1}(-1)$ c) $\operatorname{arccot}\left(\frac{\sqrt{3}}{3}\right)$ d) $\operatorname{arcsec}(2)$

28) Which of the six inverse trig functions have a range of $0 \le y \le \pi$?

29) Which of the six inverse trig functions have a range of $\frac{-\pi}{2} \le y \le \frac{\pi}{2}$?

30) Evaluate. Leave as an exact answer.

a) $\cos\left(\operatorname{arccsc}\frac{-13}{12}\right)$ b) $\sec\left(\tan^{-1}3\right)$ c) $\sin\left(\arccos\frac{2}{7}\right)$

31) Use your calculator to evaluate each. Round to three decimal places. Evaluate the inverse functions in degrees.

a) $\csc 80°$ b) $\tan -311°$ c) $\operatorname{arcsec}(-1.25)$ d) $\cot^{-1}(-4)$

e) $\arcsin(0.84)$ f) $\cot 7$ g) $\arctan 1.9$ h) $\csc^{-1}(11.5)$

32) Solve for θ .

a) $\cos\theta = \frac{1}{2}$ b) $\tan\theta = -\sqrt{3}$ c) $\csc\theta = \frac{-2\sqrt{3}}{3}$ d) $\csc\theta = \frac{1}{3}$

33) Write as an algebraic expression.

a) $\cot(\arctan x)$ b) $\sec[\sin^{-1}(x-1)]$

c) $\tan\left(\arccos\frac{x}{5}\right)$ d) $\cot\left(\tan^{-1}\left(\frac{1}{x}\right)\right)$

e) $\cos\left(\arcsin\frac{x-h}{r}\right)$