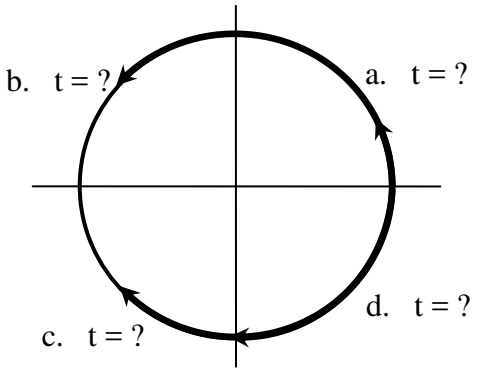
Trigonometry
Midterm Review

1. Select the appropriate arc that describes *t*, the direction and length of the arc on the unit circle.

$$\left\{\frac{\pi}{6},\frac{\pi}{3},\pi,\frac{3\pi}{2},\frac{3\pi}{4},\frac{5\pi}{6},\frac{5\pi}{4},\frac{-\pi}{4},-\frac{\pi}{2},-\frac{3\pi}{4},-\frac{7\pi}{6}\right\}$$



a. _____

b. _____

c. _____

d. _____

For each expression sketch the given arc and state the reference arc. Then find exact functional value.

2. Find the indicated functional value(s).

a. If $\cos x = -\frac{1}{2}$ and $\sin x > 0$, find $\csc x$. _____

b. If $\cos x = \frac{\sqrt{2}}{2}$ and $\sin x < 0$, find $\cot x$ _____

c. If $\sin x = a$ and $\cos x < 0$, find $\sec x$ _____

3. Write the equation for a circle with:

a. Center $(-2,3)$ and radius 4. _____

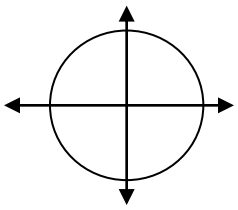
b. Center $(2,-6)$ and radius $\frac{3}{4}$. _____

4. Evaluate the expression, if it is defined. Give the exact value for the answer.

$$\frac{\cos\frac{\pi}{2}+2\sin\frac{\pi}{6}}{-2\cos^2\pi}$$ _____

For the expression sketch the given arc and state the reference arc. Then find exact functional value.

5.

Expression	Sketch Arc	Reference Arc	Functional Value
$\tan\frac{5\pi}{6}$		$x =$ _____	$\tan\frac{5\pi}{6} =$ _____

Find the arc x with initial point (1 , 0) in the indicated interval, that makes each statement true.

6. $\cos x = \frac{\sqrt{2}}{2}$ and $\frac{3\pi}{2} \le x \le 2\pi$ $x =$ _____

7. $\csc x = \frac{-1}{2}$ and $\pi \le x \le \frac{3\pi}{2}$ $x =$ _____

Find an approximation rounded to four decimal places for the following functional values.

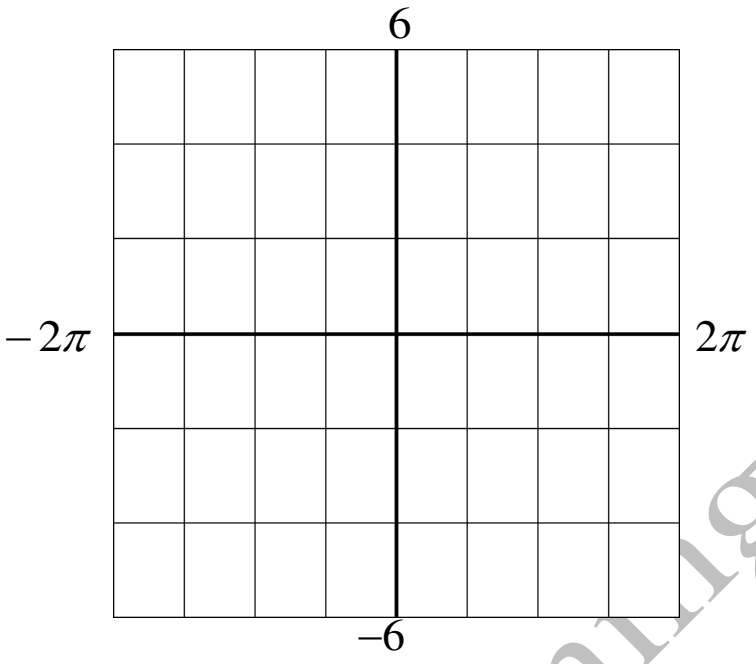
8. $\dfrac{\csc 5 - 3\tan 8}{\sec(-4.17)}$ _____

9. $\dfrac{\sec^2 3\pi + \csc^2 \frac{2\pi}{3}}{\tan^2 \frac{11\pi}{4}}$ _____

10. $\dfrac{3\cot(4.1) + 2\sec\left(-\frac{7\pi}{5}\right)}{2\sin(0.8513)}$ _____

Sketch the following sinusoidal function on the interval $-2\pi \le x \le 2\pi$.
State the range and x - intercepts.

11. $y = 6\sin x$



range: _____

x – intercepts: _____

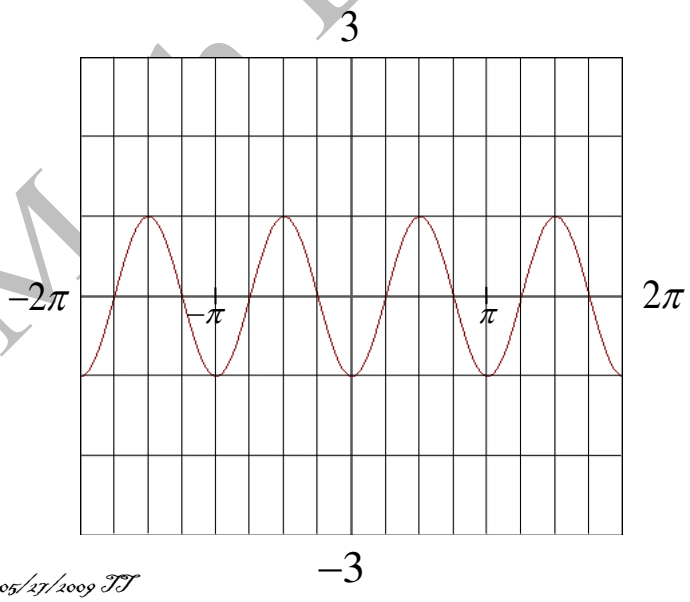
Find an equation of a function in the form

a) $y = \cos\left[B(x-C)\right]$

b) $y = \sin\left[B(x-C)\right]$

for B>0, and $0 < C < 2\pi$ that represents the given periodic graph.

12.



a) _____

b) _____

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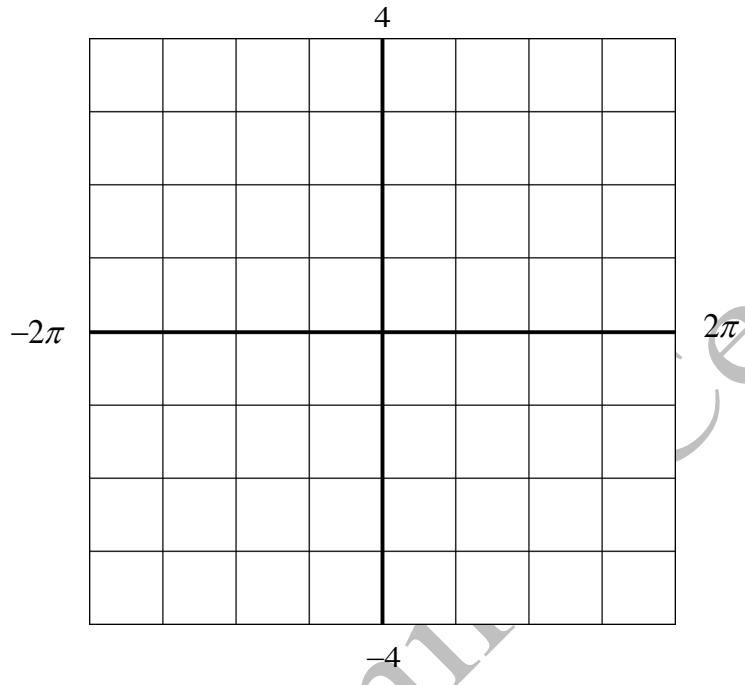
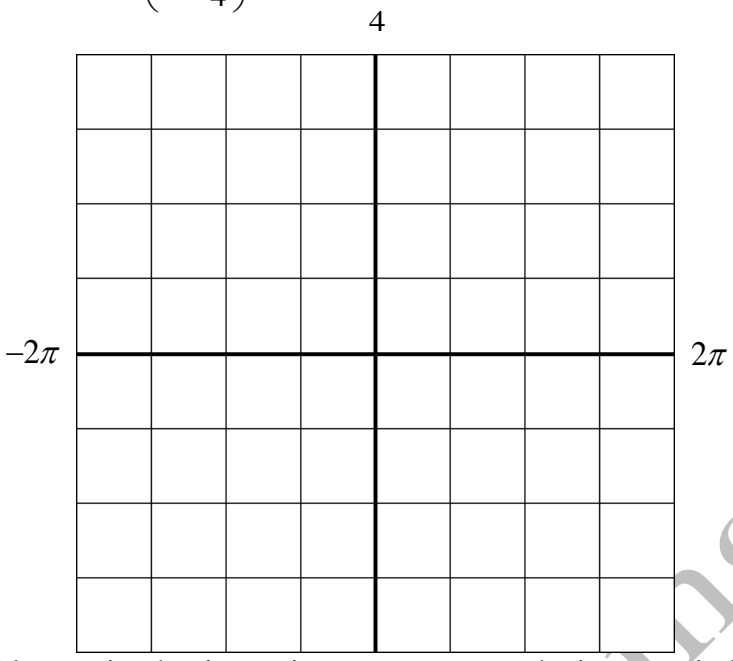
Sketch the graph of each function between -2π and 2π.

13. $y = \cot\left(x - \frac{3\pi}{2}\right)$



Sketch the graph of the function between -2π and 2π. Indicate the period and the range.

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



Period: _____

Range: _____

Consider a point that is moving at a constant velocity on a circle of radius r. Approximate the requested value to the nearest hundredth of a unit. (Caution watch your units)

15. Find ω if $v = 24m/\sec$, $r = 7\,cm$.

_____

Find $\sin\theta$, $\cos\theta$, and $\tan\theta$ for an angle θ in standard position if the given point is on its terminal side. Leave answers in exact form (i.e. No approximations from calculator).

16. $(-5,-2)$

$\sin\theta =$ _____

$\cos\theta =$ _____

$\tan\theta =$ _____

Find the exact values of the five other trigonometric values for each angle with the given information. (Rationalize denominators).

17. $\sin\alpha = -\frac{24}{25}$ and α is in QIII.

$\cos\alpha =$ _____ $\sec\alpha =$ _____

$\tan\alpha =$ _____ $\cot\alpha =$ _____

$\csc\alpha =$ _____

Solve the right triangle $(\gamma = 90°)$ with the given angle measures and/or lengths of sides.

18. $c = 38.1,\ \alpha = 39°48'$

$\beta =$ _____

$a =$ _____

$b =$ _____

Solve each triangle if possible.

19. $b = 10.7,\ c = 15,\ \beta = 42°$

$\alpha =$ _____

$\gamma =$ _____

$a =$ _____

Solve each triangle if possible.

20. $a = 4.2,\ c = 6,\ \alpha = 68°$

$\beta =$ _____

$\gamma =$ _____

$b =$ _____

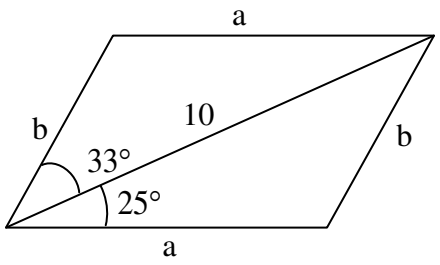
21. $a = 30,\ c = 15,\ \gamma = 30°$

$\alpha =$ _____

$\beta =$ _____

$b =$ _____

22. The diagonal of a parallelogram is 10 inches long. The diagonal make angles of $33°$ and $25°$ with the sides of the parallelogram. Find the lengths of the sides of the parallelogram.



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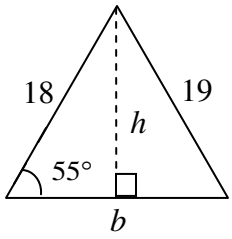
23. If $a = 19$, $\alpha = 55°$, and $c = 18$, find the altitude h to side b and then find the area of the triangle to the nearest square unit.



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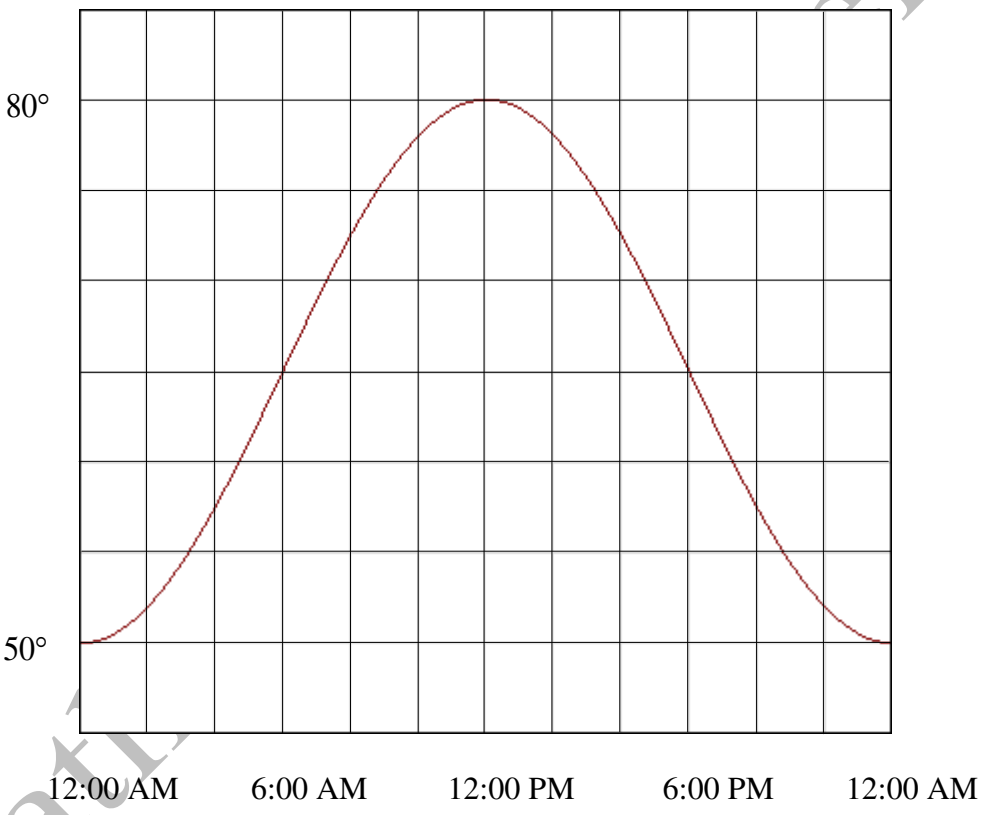
Revised

24. A spring weighted at one end is bouncing up and down with initial displacement of 25 in. The displacement is given by the equation $d(t) = 25\cos(3t)$, where t is in seconds and $d(t)$ is in inches. Find the displacement to the nearest hundredth of an inch for the following times.

    a. $t = 0.9$ _____

    b. $t = 3.5$ _____

25. The graph below represents the temperature of the water at the beach on a particular day.



    a. At what times will the temperature of the water be $73°$?

    _____

    b. Approximate the number of hours between the $73°$ temperatures.

    _____

    c. Approximate the difference in the temperature between 10 AM and 8 PM.

    _____

26. A snowboarder at the 2002 Olympics did a $900°$ flip (which is two and one-half rotations) in 2.7 seconds. What is the angular velocity (to the nearest tenth of a radian per second)?

27. A speed skater at the 2002 Olympics did 5 laps around a circular rink of radius 10 feet in 15.6 seconds. What is the skater's linear velocity (to the nearest tenth of a foot per second)?

28. The tallest freestanding structure in the world is the CN Tower in Toronto, Canada. From the ground level, the angle of elevation from point A to an object on the observation deck of the CN Tower is $75°$, and 111 feet behind point A at point B, the angle of elevation is $70°$. Find the height to the nearest foot of the object on the observation deck of the CN Tower.

29. A tourist boat is travelling from Key West to Naples, Florida, which is approximately 150 miles away. After travelling for 30 miles, the captain notices that he is $25°$ off course due to heavy winds. At that point, determine how far the tourist boat is from Naples and the angle the boat should turn to correct its course.