Precalculus Accelerated
Review - 2007
Semester 2 Review

Name: ______________________

Dream It! Believe It! Achieve It!

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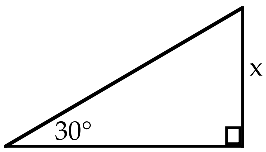
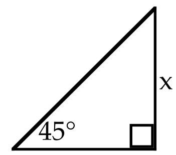
1. Know how to :
   a. Convert from degrees to radians
   b. Convert from radians to degrees
   c. Find the area of a triangle
   d. Find coterminal angles
   e. Find reference angles
   f. Use SOHCAHTOA

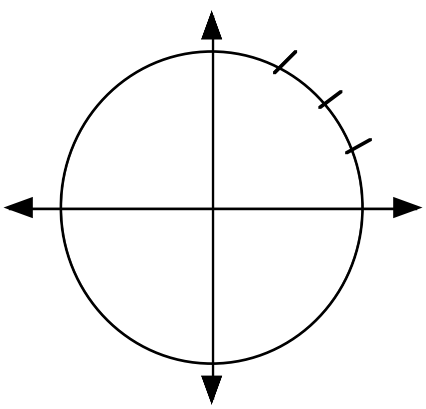
2. Label the missing sides



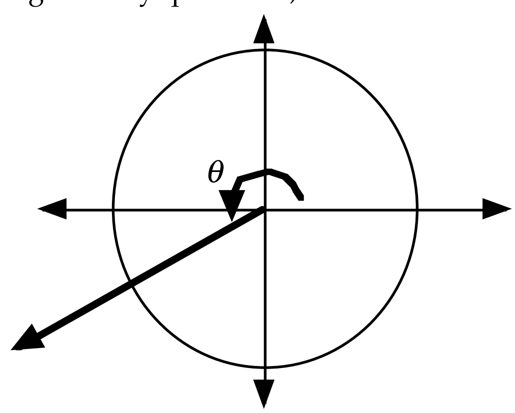
3. Label the missing sides



4. Given the following unit circles:
   a. Label in degrees and radians. Write ordered pairs for first quadrant and axis.



   b. Draw in the definitions of the six trig functions of θ as segments on the unit circle. (Make sure you can do this for an angle in any quadrant.)



5. State the three **Pythagorean Identities**:

   a.

   b.

   c.

6. State the three **Reciprocal Identities:**

   a. $\csc(x) =$

   b. $\sec(x) =$

   c. $\cot(x) =$

7. State the two **Quotient Identities:**

   a. $\dfrac{\sin(x)}{\cos(x)} =$

   b. $\dfrac{\cos(x)}{\sin(x)} =$

8. State the **Negative Identities**:

   a. $\cos(-x) =$

   b. $\sin(-x) =$

   c. $\tan(-x) =$

9. State the six **Cofunctions**:

   a. $\sin(90^\circ - x)$ =________________
   b. $\cos(90^\circ - x)$ =________________
   c. $\tan(90^\circ - x)$ =________________
   d. $\cot(90^\circ - x)$ =________________
   e. $\sec(90^\circ - x)$ =________________
   e. $\csc(90^\circ - x)$ =________________
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10. State the six **Sum and Difference Identities**:

a. $\sin(A+B)$ =_____ b. $\sin(A-B)$ =_____

c. $\cos(A+B)$ =_____ d. $\cos(A-B)$ =_____

e. $\tan(A+B)$ =_____ e. $\tan(A-B)$ =_____

11. State the five **Double Angle Identities**:

a. $\sin(2A)$ =_____ b. $\cos(2A)$ =_____

c. $\cos(2A)$ =_____ d. $\cos(2A)$ =_____

e. $\tan(2A)$ =_____

12. Given $y = A\sin\left[B(x+C)\right]+D$, identify the

a. **amplitude**:

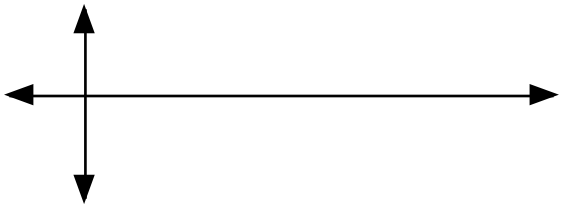
b. **period**: (**period** for tangent/cotangent:)

c. **phase shift**:

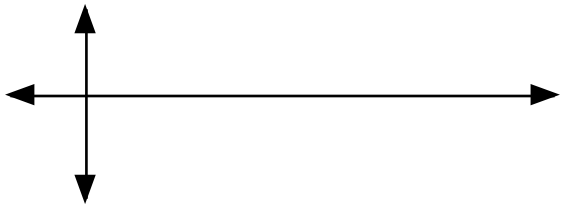
d. **vertical shift**:

13. Label the axes and sketch one period for each:

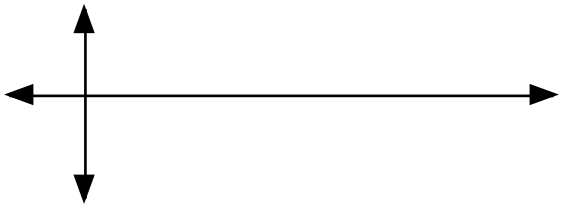
a. $y = \sin(x)$



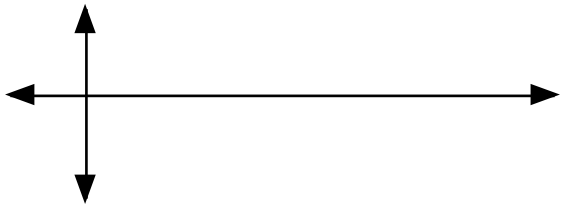
b. $y = \cos(x)$



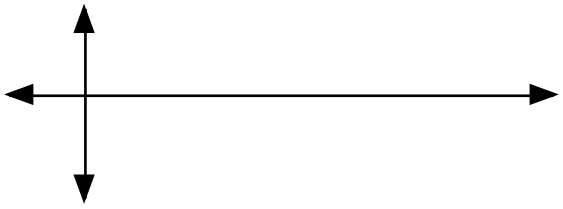
c. $y = \sec(x)$



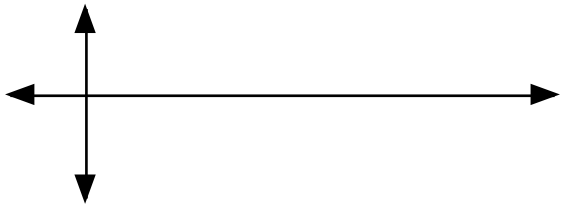
d. $y = \csc(x)$



e. $y = \tan(x)$ (sketch 2 periods)



f. $y = \cot(x)$ (sketch 2 periods)



14. State the **domain** and **range** for each of the following:

a. $Sin^{-1}(x)$ or $Arc\sin(x)$ b. a. $Tan^{-1}(x)$ or $Arc\tan(x)$

c. a. $Cos^{-1}(x)$ or $Arc\cos(x)$

All problems with a " * "should be done without the calculator!

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Unit Circle Trig

*1. Convert $-90°$ to radians.

Give the answer in terms of π.

*2. Convert $\frac{5\pi}{9}$ radians to degrees.

*3. Find two angles, one positive and one negative, that are coterminal with each given angle.

a. $-100°$

b. $\frac{7\pi}{4}$

*4. Give the exact value of each expression in simplest radical form.

a. $\sin\frac{5\pi}{6}$

b. $\cos(-180°)$

c. $\sin 210°$

d. $\cos\frac{5\pi}{6}$

e. $\csc 135°$

f. $\sec\frac{2\pi}{3}$

g. $\cot(-60°)$

h. $\tan(-\pi)$

*5. If $\cot x = -\frac{1}{3}$ where $\frac{\pi}{2} < x < \pi$ find the values of the other five trigonometric functions.

*6a. Find the reference angle of $-210°$.

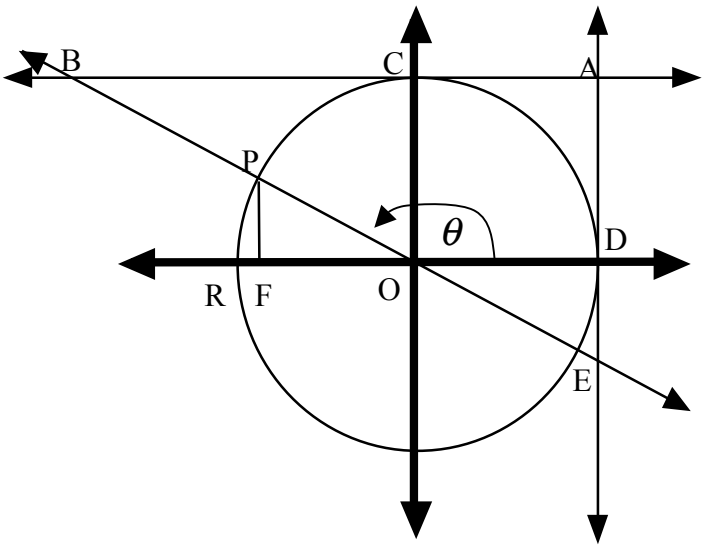
*6b. Find the reference angle of $\frac{11\pi}{7}$.

*7. State which segment, in the diagram at the right, represents each of the following:

$\sin\theta =$ $\qquad$ $\csc\theta =$

$\cos\theta =$ $\qquad$ $\sec\theta =$

$\tan\theta =$ $\qquad$ $\cot\theta =$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Trig Graphs:

*1. Sketch the graph of $y = -2\cos\left(\frac{x}{3}\right)+1$.

amplitude: _____

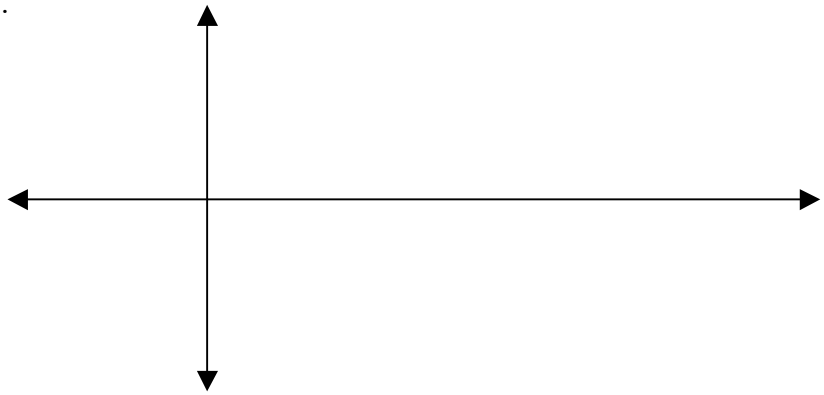
period: _____

phase shift: _____

vertical shift: _____

D: _____ R: _____

Even, Odd or Neither?



*2. Sketch the graph of $y = |\csc x|$.

amplitude (of recip): _____

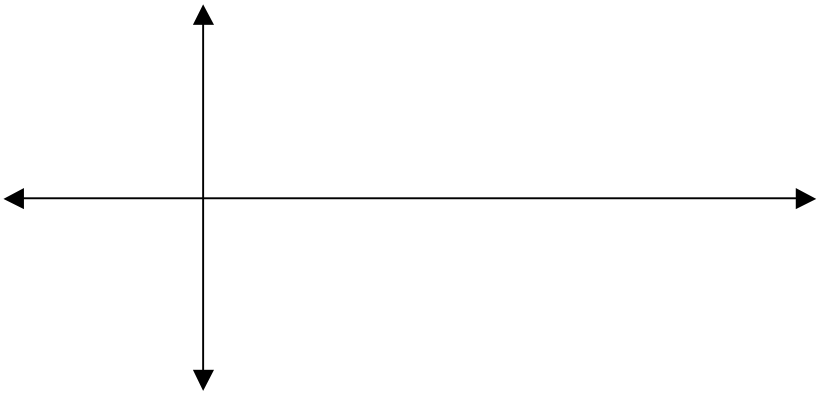
period: _____

phase shift: _____

vertical shift: _____

D: _____ R: _____

Even, Odd or Neither?



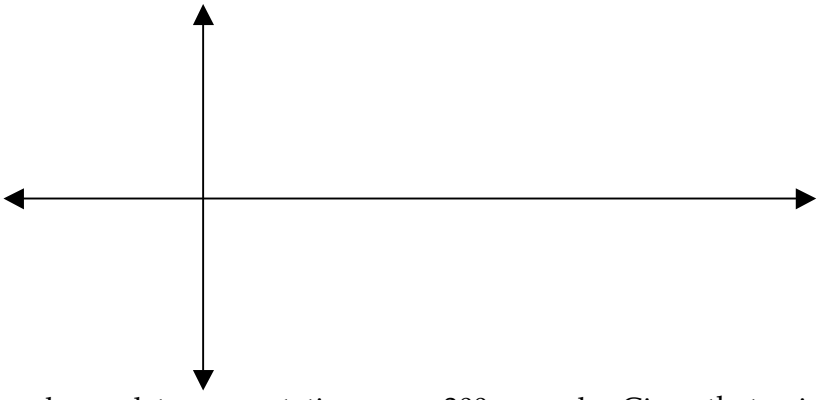
*3. Sketch the graph of $y = \frac{1}{2}\tan\left(\frac{x}{3}-\pi\right)$.

period: _____

phase shift: _____

D: _____ R: _____

Even, Odd or Neither?



*4. A Ferris wheel has a diameter of 52 feet and completes one rotation every 200 seconds. Given that point P starts at the bottom of the Ferris wheel, which is 8 feet off the ground, sketch a graph and write a sine and a cosine equation for the height of P over time.

*5. The temperature in Santa Fe, New Mexico on a given day in July reaches a high of 94° F at 2 p.m. The coldest temperature of the day is 62° F, recorded 12 hours before the high temperature of the day. If $t = 0$ represents midnight, write a sine and a cosine equation that describes the temperature during this day. Include a sketch of the graph.

Triangle Trig:

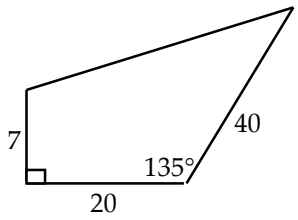
Directions - Where appropriate, give angle measures to the nearest tenth of a degree and lengths of sides in simplest radical form or to three decimal places.

1. At a distance of 200m, the angle of elevation to the top of a building is 70°. About how tall is the building?

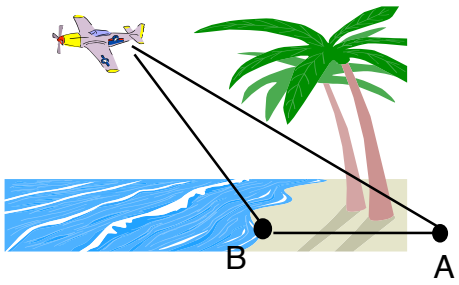
2. A regular octagon is inscribed in a circle of radius 6 in. Find the area of the octagon.

   Remember: $Area_{\Delta} = \frac{1}{2}ab\sin C$

3. Find the area of the quadrilateral shown. Remember: $Area_{\Delta} = \frac{1}{2}ab\sin C$



4. Two observers are standing on a beach. Observer B is standing at the waters edge and Observer A is 50 meters inland, directly behind Observer B. An airplane passes directly overhead and proceeds directly out over the water. At the moment that the angles of elevation from Observer A and Observer B to the plane are 40° and 80°, respectively, determine how far the plane is from each observer.



Inverse Trig, Identities, and Trig Equations

*1. Give the exact value of each expression.

a. $Tan^{-1}\left(-\frac{\sqrt{3}}{3}\right)$

b. $\sec\left(Sin^{-1}\frac{1}{2}\right)$

c. $\csc\left(Cos^{-1}\left(-\frac{3}{5}\right)\right)$

d. $Sin^{-1}\left(\sin\frac{5\pi}{4}\right)$

*2. Simplify the given expression.

a. $\cos 75° \cos 15° - \sin 75° \sin 15°$

b. $\sin 75° \cos 15° - \cos 75° \sin 15°$

c. $\sin (30° + x) + \sin (30° - x)$

d. $\cos (45° - x) - \cos (45° + x)$

*3. Find $\tan\left(\frac{7\pi}{4} - \theta\right)$ when $\tan\theta = \frac{1}{3}$.

*4. If $\tan\alpha = \frac{1}{3}$ and $\tan\beta = \frac{1}{2}$, show that

$$\tan(\alpha + \beta) = 1. \quad 0 < \alpha < \beta < \frac{\pi}{2}$$

*5. Suppose $\angle A$ is acute and $\cos A = \frac{5}{13}$. Find each of the following.

a. $\tan 2A$

b. $\cos 2A$

c. $\sin 2A$

*6. Simplify the given expression.

a. $\frac{1 + \cos 2x}{\sin 2x}$

b. $\cos^2\frac{x}{4} - \sin^2\frac{x}{4}$

c. $\frac{\csc^2 x - 1}{\sec^2 x - 1}$

*7. Evaluate the given expression.

a. $2\sin\frac{\pi}{12}\cos\frac{\pi}{12}$

b. $1-2\sin^2\frac{5\pi}{12}$

*8. Solve $4\sin^2\theta-1=0$ for $[-\pi,\pi)$

*9. Solve $2\sin^2\theta=3\cos\theta+3$ for $0\le\theta<360°$

10. Solve $3-2\csc x=17$ *for* $0\le x<2\pi$. Give answers to the nearest hundredth of a radian.

*11. Solve $\sin\theta\tan\theta=\sin\theta$ for $0\le\theta<360°$

*12. Solve $\cos 2x=\sin x-2$ for $0\le x<2\pi$

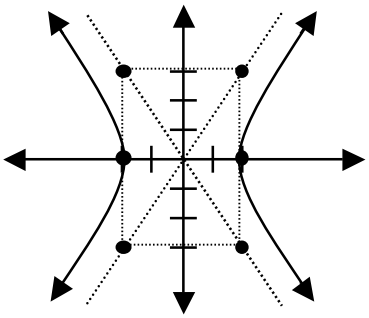
*13. Solve $\cos\left(2x-\frac{\pi}{2}\right)=\frac{\sqrt{3}}{2}$ for $0\le x<2\pi$

Conics and Parametrics

1. What type of conic is represented by $9x^2-72x-16y^2-32y=16$, and what would its equation be in graphing form?

2. Write the equation of a circle with a center at (6, 1) and a radius of 7.

3. Write the equation for the conic below.



4. Give the requested information and graph each of the following:

a. $x-3=(y-2)^2$

vertex:

x/y-int..:

axis of sym:

symmetry pt.:

Domain: Range:

b. $-9x^2+4y^2=36$

center:

vertices:

asymptotes:

Domain: Range:

c. $\frac{(x-2)^2}{9}+\frac{(y-1)^2}{4}=1$

center:

vertices:

Domain: Range:

5. Given the following set of parametric equations, eliminate the parameter and write the rectangular equation. Be sure to include any restrictions. Then sketch the rectangular graph.

$$\begin{cases} x = \dfrac{1}{t-2} \\ y = 3t+1 \end{cases}$$

6. Determine if the set of parametric equations have a simultaneous solution. If they do, give the time and location, if not, explain how you know.

$$\begin{cases} x_1 = 2t+4 \\ y_1 = t^2-1 \end{cases} \qquad \begin{cases} x_2 = 4t \\ y_2 = t^2-t+1 \end{cases}$$

7. Given the following table, determine the parametric equations.

t	(x,y)
1	(2,9)
3	(8,3)
5	(14,1)
7	(20,3)
9	(26,9)

8. Given the following set of parametric equations, eliminate the parameter and write the rectangular equation. Be sure to include any restrictions. Sketch the rectangular graph.

$$\begin{cases} x = 4t^2-3 \\ y = t-2 \end{cases}$$

<u>*Statistics*</u>. These are the topics you need to know:

Limits (graphical and numerical)
Histograms
Box and Whisker Plots
Bivariate with Residuals