

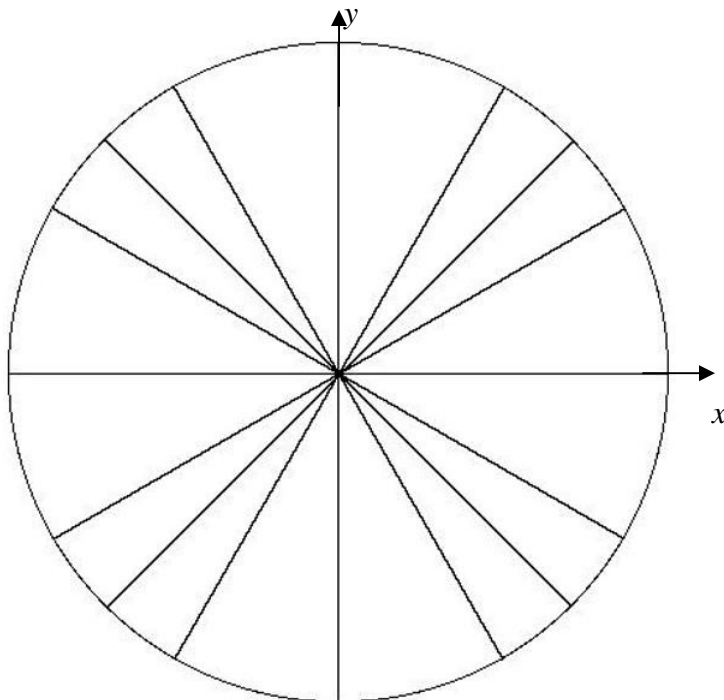
## MAT170 Review Problems for Exam 3

### A. Angles and Radian Measures (*Section 4.1*)

1. (a) Convert the angle  $-225^\circ$  to radians. Express answer as a multiple of  $\pi$ .  
 (b) Convert the angle  $\frac{3\pi}{2}$  radians to degrees.
2. (a) Find a positive angle less than  $360^\circ$  that is coterminal with the angle  $-760^\circ$ .  
 (b) Find a positive angle less than  $2\pi$  radians that is coterminal with the angle  $\frac{17\pi}{2}$ .
3. Find the length of arc on a circle with radius  $r = 16$  inches intercepted by a central angle  $\theta = 60^\circ$ . Round the answer to 2 decimal places.
4. If the length of the arc on a circle of radius 10 cm is 20 cm, find the measure of the central angle in degrees.
5. Draw  $620^\circ$  in standard position. Find a coterminal angle for  $620^\circ$  between  $0^\circ$  and  $360^\circ$ . Find a coterminal angle less than zero for  $620^\circ$ . Find the reference angle for  $620^\circ$ .

### B. Trigonometric Functions (*Section 4.2*)

1. (a) Given that  $\sin(t) = \frac{6}{7}$  and  $t$  is in quadrant II.  
 Find the exact value  $\cos(t)$ ,  $\tan(t)$ ,  $\sec(t)$ ,  $\csc(t)$ , and  $\cot(t)$ .  
 (b) Given that  $\cos(t) = \frac{-3}{5}$  and  $t$  is in quadrant III.  
 Find the exact value  $\sin(t)$ ,  $\tan(t)$ ,  $\sec(t)$ ,  $\csc(t)$ , and  $\cot(t)$ .
2. Label the unit circle, i.e. label all the special angles, and the  $x$  and  $y$  coordinates for the angles.



**C. Applications (Section 4.3)**

1. A telephone pole is 55 feet tall. How long should a guy wire be if it to be attached 15 feet from the top and is to make an angle of  $35^\circ$  with the ground? Give your answer to the nearest tenth of a foot.
2. A plane is flying at an altitude of 9000m. The pilot finds that the angle of depression to the airport is  $20^\circ$ . Find the distance between a point on the ground directly below the plane and the airport.

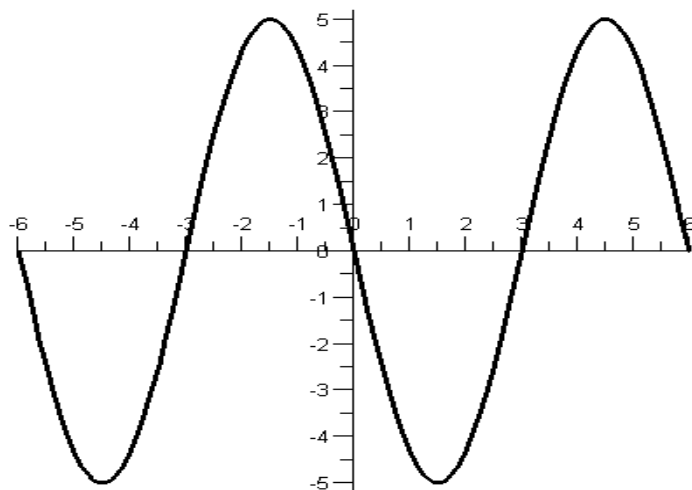
**D. Reference Angle (Section 4.3)**

1. Find the reference angle for each of the following angles;

a)  $210^\circ$       b)  $-250^\circ$       c)  $\frac{23\pi}{4}$       d)  $-\frac{13\pi}{3}$

**E. Graphs of Trigonometric Functions (Section 4.5 - 4.6)**

1. (a) Given the function  $y = -2\sin\left(2x + \frac{\pi}{2}\right)$  find the amplitude, period, and phase shift.  
 (b) Given the function  $y = 4\cos(3x + \pi)$  find the amplitude, period, and phase shift.
2. Find the equation for the graph shown below.



3. (a) Suppose  $\sin(-t) = \frac{-1}{2}$  and  $\cos(-t) = \frac{\sqrt{3}}{2}$ , find  $\tan(t)$   
 (b) Suppose  $\sin(-t) = -0.32$  find  $\csc(t)$ .
4. (a) Graph the function  $f(x) = 2\sec(x)$  to determine the range of  $f(x)$ .  
 (b) Graph the function  $g(x) = 3\csc(x)$  to determine the range of  $g(x)$ .

**F. Inverse Trigonometric Functions (Section 4.7)**

Find the exact value of each of the following:

1.  $\sin^{-1}\left(\frac{-\sqrt{3}}{2}\right)$
2.  $\cos\left[\tan^{-1}\left(\frac{2}{3}\right)\right]$
3.  $\tan(\cos^{-1} x)$
4.  $\sin^{-1}\left[\sin\left(\frac{2\pi}{3}\right)\right]$
5.  $\cos^{-1}[\cos(135^\circ)]$
6.  $\sin^{-1}\left[\sin\left(\frac{7\pi}{6}\right)\right]$
7.  $\cos\left(\sin^{-1}\left(\frac{x}{3}\right)\right)$
8.  $\tan(\sin^{-1}(3x))$

### G. Verifying Trigonometric Identities (Section 5.1)

Verify each trigonometric identity:

1.  $(\cos(\theta) - \sin(\theta))^2 + (\cos(\theta) + \sin(\theta))^2 = 2$
2.  $\frac{\tan(\theta) \cdot \cot(\theta)}{\csc(\theta)} = \sin(\theta)$
3.  $\tan(\theta) + \frac{\cos(\theta)}{1 + \sin(\theta)} = \sec(\theta)$
4.  $\cot(x) + \tan(x) = \sec(x) \csc(x)$
5.  $(\sec(x) - \tan(x))^2 = \frac{1 - \sin(x)}{1 + \sin(x)}$
6.  $\frac{1 - \cot(x)}{\cos(x)} = \sec(x) - \csc(x)$

### H. Sum and Difference Formulas (Section 5.2)

1. Find the exact value of the expression:  $\cos \frac{5\pi}{12} \cos \frac{\pi}{12} + \sin \frac{5\pi}{12} \sin \frac{\pi}{12}$
25. Find the exact value of the expression:  $\cos(135^\circ + 30^\circ)$
3. Find the exact value of the expression:  $\frac{\tan \frac{\pi}{5} - \tan \frac{\pi}{30}}{1 + \tan \frac{\pi}{5} \tan \frac{\pi}{30}}$
4. Verify the identity:  $\cos\left(x - \frac{\pi}{2}\right) = \sin x$