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1. Find each of the following:

a) The complement of a  $48^\circ$  angle.

b) The radian measure of a  $160^\circ$  angle.

c) Give the quadrant and the reference angle for  $585^\circ$ .

d) Give the angle (in radians) of least positive measure that is coterminal with  $-13\pi/6$

2. Give the exact value of each of the following: Calculator answers will not be accepted.

a)  $\cos(-13\pi/6) + \sin(7\pi/4)$       b)  $\csc^2(225^\circ) - 3\cot(300^\circ)$

3. The angle of depression from the top of a tower to a point 20 meters from the bottom of the tower is  $35^\circ$ . To the nearest tenth of a meter, how tall is the tower?

4. For an angle  $\theta$  in quadrant IV, label each of the following as POSSIBLE or NOT POSSIBLE. Give reasons for your answers.

a)  $\sin\theta = -2$

b)  $\cos\theta = -1/2$

c)  $\sec\theta = 1/3$

d)  $\tan\theta = -2$

5. Suppose that point  $P$  is on a circle with radius 60 cm, and ray  $OP$  is rotating with angular speed  $3\pi/4$  radians per sec. You may leave  $\pi$  in your answers.

a) Find the angle generated by  $P$  in 5 sec.

b) Find the distance traveled by  $P$  along the circle in 5 sec.

c) Find the linear speed of point  $P$  in cm per sec.

6. Give all values of  $\theta$  in  $[0, 2\pi)$  for which each of the following is true:

a)  $\sec\theta = -2$

b)  $2\sin^2\theta + \sin\theta = 1$

7. Verify the following identity for all  $t$  for which the expressions exist:

$$1 + \cot^2 t = \frac{1}{1 - \cos^2 t}$$

8. Suppose that  $A$  is an angle in standard position with  $\sin A = 5/13$  and  $0 < A < \pi/2$ . Find the exact value (without using a calculator) of each of the following:

a)  $\sin(2A)$

b)  $\cos\left(A + \frac{4\pi}{3}\right)$

9. Given  $\cos 2\theta = 9/25$  and  $90^\circ < \theta < 180^\circ$ , find  $\sin\theta$  and  $\sin(-\theta)$ .

10. Use an identity to find the exact value of  $\cos(\pi/8)$ . Calculator answers will not be accepted.

11. Find the exact value of  $\frac{\tan 50^\circ - \tan 20^\circ}{1 + \tan 50^\circ \tan 20^\circ}$ . Calculator answers will not be accepted.

12. Sketch a graph of  $y = 2\sin(3x + \pi)$  through one period. Give its amplitude, period, phase shift, and the direction and amount of any vertical translation. Label your intercepts and locations of any maximum and minimum values.

13. Find the exact value of each of the following without using a calculator.

a)  $\arcsin(1/2)$

b)  $\arccos(\sin(3\pi/2))$

c)  $\cos(\tan^{-1}(2))$

14. Find all triangles  $ABC$  that satisfy  $A = 43.5^\circ$ ,  $a = 10.7$  cm, and  $c = 7.2$  cm.

15. For the vectors  $\mathbf{u} = \langle 2, -6 \rangle$  and  $\mathbf{v} = \langle 3, 1 \rangle$ , find

a)  $3\mathbf{u} - 2\mathbf{v}$

b)  $|\mathbf{u}|$

c) the angle  $\theta$  between  $\mathbf{u}$  and  $\mathbf{v}$ .

## Formula Sheet for Math 1321 Final Exam 2012

### Sum and Difference Formulas

$$\cos(A + B) = \cos A \cos B - \sin A \sin B$$

$$\cos(A - B) = \cos A \cos B + \sin A \sin B$$

$$\sin(A + B) = \sin A \cos B + \cos A \sin B$$

$$\sin(A - B) = \sin A \cos B - \cos A \sin B$$

$$\tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$$

$$\tan(A - B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$$

### Double Angle Formulas

$$\cos(2A) = \cos^2 A - \sin^2 A$$

$$\cos(2A) = 2 \cos^2 A - 1$$

$$\cos(2A) = 1 - 2 \sin^2 A$$

$$\sin(2A) = 2 \sin A \cos A$$

$$\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$$

### Half-Angle Formulas

$$\cos\left(\frac{A}{2}\right) = \pm \sqrt{\frac{1 + \cos A}{2}}$$

$$\sin\left(\frac{A}{2}\right) = \pm \sqrt{\frac{1 - \cos A}{2}}$$

$$\tan\left(\frac{A}{2}\right) = \pm \sqrt{\frac{1 - \cos A}{1 + \cos A}}$$

$$\tan\left(\frac{A}{2}\right) = \frac{\sin A}{1 + \cos A}$$

$$\tan\left(\frac{A}{2}\right) = \frac{1 - \cos A}{\sin A}$$