

Student Name: \_\_\_\_\_

Show all relevant work (use back of pages for scratch paper, if needed). **CIRCLE FINAL ANSWERS.**  
Each problem is worth 8 points (and you get one point for clearly writing your name above).

1. Find the exact value of each expression (show answers as fractions not decimals).

a)  $\tan\left(-\frac{\pi}{12}\right)$

b)  $\sin 105^\circ$

2. Write out the Addition Formula for cosine:

$$\cos(\theta + \phi) =$$

3. Write out the Double-Angle Formula for tangent:

$$\tan 2\theta =$$

4. Circle any of the following expressions (possibly more than one) that is equivalent to  $\sin \theta$

$$\cos\left(\frac{\pi}{2} - \theta\right)$$

$$\frac{1}{\csc \theta}$$

$$\sec(-\theta)$$

$$\cos^2 \theta$$

5. Evaluate  $\cos(\theta - \phi)$  given that  $\tan \theta = \frac{4}{3}$ ,  $\theta$  in Quadrant III,  $\sin \phi = \frac{-\sqrt{33}}{7}$ ,  $\phi$  in Quadrant IV.

6. Find the exact value (fractions not decimals) of:  $\cos\left(2 \tan^{-1} \frac{12}{5}\right)$

7. Circle the one expression below that is equal to:  $\tan\theta + \cot\theta = ??$

A.  $\cos\theta + \sin\theta$

B.  $\sec\theta \csc\theta$

C.  $\sec^2\theta$

D.  $2 + \sin\theta$

8. Circle the one expression below that is equal to:  $\sin^2\theta \cot^2\theta + \cos^2\theta \tan^2\theta = ??$

A.  $\cos 2\theta$

B.  $\csc^2\theta$

C. 1

D.  $2\sin\theta$

9. Circle the one expression below that is equal to:  $1 + \tan\theta \tan\frac{\theta}{2} = ??$

A.  $\csc\theta$

B.  $\cos\theta + 1$

C.  $\cot^2\theta$

D.  $\sec\theta$

10. Find all solutions for  $\theta$  in the given equations (answers may be in either degrees or radians).

a)  $\sin(3\theta) - 2\sin^2(3\theta) = 0$

b)  $\tan\theta = 7$  (hint: use calculator and express answer to two decimal places)

c)  $\cos 2\theta = 3\sin\theta - 1$