

**EXAM 3**  
Math 117  
December 5, 2008

Name \_\_\_\_\_

You must show all your work. Partial credit will be given.

1. Find the angle coterminal with  $\frac{17\pi}{6}$  and then find the tangent of this angle.

2. Suppose  $\cos(\theta) = -\frac{1}{9}$  and  $\frac{\pi}{2} \leq \theta \leq \pi$ . Find  $\tan(\theta)$ ,  $\csc(\theta)$  and  $\cos(\theta + \pi)$ .

3. Simplify the expression  $\frac{\sin^2(x) - 2\sin(x) + 1}{\sin(x) - 1}$

4. Find the amplitude and the period of the function  $f(\theta) = 4 \sin(3\theta)$ .

5. Write a periodic function which has amplitude 6 and a period of  $\frac{1}{3}$ .

6. Find  $(\sin(2\theta) + \cos^2(\theta))(\cos(2\theta) + \cos^2(\theta))$

7. Factor  $3 \tan^2(\theta) + 5 \tan(\theta) - 2$ .

8. Suppose  $f(\theta) = \tan(\theta + 3)$  and  $g(\theta) = \theta^2 - 1$ . Find  $f \circ g$  and  $g \circ f$ .

9. For each of the following identities prove that they are true.

(a) 
$$\frac{\sec(t) + \csc(t)}{1 + \tan(t)} = \csc(t)$$

(b) 
$$\sin(x) \tan(x) + \cos(x) = \sec(x)$$

(c) 
$$\cos(x) \sec(x) - \sin^2(x) = \cos^2(x)$$

(d) 
$$\frac{1 - \tan^2(x)}{1 + \tan^2(x)} = 2 \sin^2(x)$$

10. For each of the following equations determine whether or not they true and show why.

(a)  $\cot^2(x) - 1 = \csc^2(x)$

(b)  $\cos^4(x) - \sin^4(x) = \cos(2x)$

(c)  $\frac{\cos(x+y)}{\sin(x)\cos(y)} = \cot(x) - \tan(y)$

11. On the next page are graphs created from the formulas below. Write each formula on its correct graph.

- $\cos(2x + \frac{\pi}{2})$
- $2 \cos(.5x) + 1$
- $2 \cos(x)$
- $\tan(x - \frac{\pi}{2})$
- $\sin(x - 2)$
- $\frac{1}{2} \sin(2x + \frac{\pi}{4}) + 3$

