First Name:_____ Last Name: _____ Student ID: _____

Identities and Equations (2)

1. Use an appropriate double angle formula to rewrite each expression as a single trigonometric ratio.

a. $6\sin(3x)\cos(3x)$

b. $1-2\cos^2(\frac{\alpha}{2})$

c. $\frac{\tan\theta}{tan^2(\theta)-1}$

d. $\frac{\cos^2(3y)-sin^2(3y)}{\sin(3y)\cos(3y)}$

2. Derive a formula for

a. $\sin(3\theta)$ in terms of $\sin(\theta)$
b. $\cos(4\theta)$ in terms of $\cos(\theta)$
c. $\cot(2\theta)$ in terms of $\cot(\theta)$

3. Simplify each of the following trigonometric expressions using an appropriate double angle formula, then determine the exact value of the expression.

a. $1-2\sin^2(\frac{11\pi}{8})$

b. $1-2\cos^2(105°)$

c. $4\sin(112.5°)\cos(112.5°)$

d. $\frac{1-tan^2(\frac{\pi}{12})}{\tan(\frac{\pi}{12})}$

e. $\cos^2(\frac{11\pi}{12})$

4. a. Given $\sin(\theta) = \frac{3}{4}$ where $\frac{\pi}{2} \leq \theta \leq \pi$, determine the exact value of $\sin(2\theta)$.

b. Given $\cos(2\theta) = -\frac{7}{8}$, where 2θ is an angle in standard position with a terminal arm in quadrant 3, determine the exact value of $\cos(\theta)$ and $\sin(\theta)$

5. Determine the exact value of each.

a. $\cos(22.5°)$ b. $\sin(\frac{7\pi}{12})$ c. $\tan(\frac{5\pi}{8})$

6. Solve for x within the specified domain. Keep answers exact whenever possible.

a. $\tan(x)\cos(x) = 0,\ 0 \le x \le 2\pi$ b. $(2\cos(x)+\sqrt{3})(\csc(x)-\sqrt{2}) = 0,\ 0 \le x \le 2\pi$

c. $2\cos^2(x)+\sqrt{3}\cos(x)=0,\ -\pi \le x \le \pi$ d. $2\sin(x)\sec(x)=6\sin(x),\ 0° \le x \le 360°$

7. Determine the exact values of a and b such that the quadratic trigonometric equation $a\cos^2(x) + b\cos(x) - 3 = 0$ has the solutions $\frac{\pi}{4}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{7\pi}{4}$ in the interval $0 \le x \le 2\pi$.

8. Determine roots of $\sin(x) + \cos(x) = \sqrt{\frac{3}{2}}$ for $0 \le x \le 2\pi$.