HOMEWORK 8 - MATH 140 DUE DATE: Monday, April 4 INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. One part of each homework problem will be chosen at random and graded. Each question is worth 1 point. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

- 1. In the following problems, use the information given about the angle $\theta, 0 \leq \theta < 2\pi$, to find the exact value of $\sin(2\theta), \cos(2\theta), \sin\frac{\theta}{2}, \cos\frac{\theta}{2}$.
 - (a) $\cos \theta = \frac{3}{5}, 0 < \theta < \frac{\pi}{2}$
 - (b) $\csc \theta = -\sqrt{5}, \cos \theta < 0$
- 2. (a) Develop a formula for $\cos(3\theta)$ as a third-degree polynomial in the variable $\cos \theta$. (b) Show that $\frac{\cos \theta + \sin \theta}{\cos \theta - \sin \theta} - \frac{\cos \theta - \sin \theta}{\cos \theta + \sin \theta} = 2 \tan(2\theta)$.
- 3. Find the exact value of the expressions
 - (a) $\sin \left[2 \sin^{-1} \frac{\sqrt{3}}{2}\right]$ (b) $\cos^2 \left(\frac{1}{2} \sin^{-1} \frac{3}{5}\right)$
- 4. Establish the identities:

(a)
$$\frac{\cos\theta + \cos(3\theta)}{2\cos(2\theta)} = \cos\theta$$

(b)
$$\frac{\cos(4\theta) - \cos(8\theta)}{\cos(4\theta) + \cos(8\theta)} = \tan(2\theta)\tan(6\theta)$$

5. Solve the following equations

(a)
$$\tan(\theta) = 1$$
 (b) $\cos \theta = -\frac{\sqrt{3}}{2}$ (c) $\sin(2\theta) = -1$.

- 6. Solve each equation on the interval $0 \le \theta < 2\pi$.
 - (a) $1 \cos \theta = \frac{1}{2}$ (b) $4 \cos^2 \theta - 3 = 0$
- 7. Solve each equation on the interval $0 \le \theta < 2\pi$.
 - (a) $\sin^2 \theta 1 = 0$
 - (b) $2\cos^2\theta + \cos\theta 1 = 0$
 - (c) $\cos^2 \theta \sin^2 \theta + \sin \theta = 0$
- 8. Solve each equation on the interval $0 \le \theta < 2\pi$.
 - (a) $\sin^2 \theta = 2\cos \theta + 2$
 - (b) $\sec \theta = \tan \theta + \cot \theta$
 - (c) $\sqrt{3}\sin\theta + \cos\theta = 1$