HOMEWORK 10 - MATH 140 DUE DATE: Monday, November 22 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. Use half angle formulas to find $\sin 22.5^{\circ}$ and $\cos \left(-\frac{3p}{8}\right)$.
- 2. Establish the identities:
 - (a) $\frac{\cot \theta \tan \theta}{\cot \theta + \tan \theta} = \cos (2\theta)$ (b) $\csc^2 \frac{\theta}{2} = \frac{2}{1 - \cos t heta}$ (c) $\frac{\sin (3\theta)}{\sin \theta} - \frac{\cos (3\theta)}{\cos \theta} = 2$
- 3. Show that
 - (a) $\frac{\sin(4\theta) \sin(8\theta)}{\cos(4\theta) \cos(8\theta)} = -\cot(6\theta)$
 - (b) $\frac{\sin \alpha + \sin \beta}{\cos \alpha + \cos \beta} = \tan \frac{\alpha + \beta}{2}$
- 4. Solve the equations for $0 \le \theta < 2\pi$.
 - (a) $4\cos^2\theta 3 = 0$

(b)
$$\cos\left(\frac{\theta}{3} - \frac{\pi}{4}\right) = \frac{1}{2}$$

- 5. Solve the equations for $0 \le \theta < 2\pi$.
 - (a) $\sin^2 \theta = 6(\cos \theta + 1)$
 - (b) $\cos(2\theta) + \cos(4\theta) = 0$
 - (c) $\cos(2\theta) + 5\cos\theta + 3 = 0$
 - (d) $\sin\theta + \cos\theta = \sqrt{2}$
- 6. Suppose $\triangle ABC$ is a right triangle with right angle \widehat{C} and hypotenuse c.
 - (a) If b = 4, $\hat{B} = 10^{\circ}$, find a, c and \hat{A} .
 - (b) If a = 2, b = 8 find c, \widehat{A} and \widehat{B} .
- 7. At 10 AM on April 26, 2000, a building 300 feet high casts a shadow 50 feet long. What is the angle of elevation of the sun?
- 8. Use the law of sines to solve the triangles
 - (a) $\hat{A} = 50^{\circ}, \hat{C} = 20^{\circ}, a = 3$
 - (b) $\hat{B} = 20^{\circ}, \hat{C} = 70^{\circ}, a = 1$
 - (c) $b = 4, c = 3, \hat{B} = 40^{\circ}$