PRACTICE EXAM 4 - MATH 140 DATE: Thursday, April 7 INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. Each question is worth 3 points. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

- 1. Find the exact value of the expression $\sin(\tan^{-1}(-3))$.
- 2. Prove the identity $\frac{\sec \theta}{\csc \theta} + \frac{\sin \theta}{\cos \theta} = 2 \tan \theta$ starting from the left-hand side.
- 3. Calculate the value of the expressions $\cos(\alpha + \beta)$ and $\sin(\alpha \beta)$, where

$$\cos \alpha = \frac{1}{2}, -\frac{\pi}{2} < \alpha < 0, \sin \beta = \frac{1}{3}, 0 < \beta < \frac{\pi}{2}.$$

4. Show that $\sec(\alpha + \beta) = \frac{\csc \alpha \csc \beta}{\cot \alpha \cot \beta - 1}$.

5. Show that $\sec(2\theta) = \frac{\sec^2\theta}{2 - \sec^2\theta}$.

6. Solve the equation $1 + \sin \theta = 2\cos^2 \theta$ on the interval $0 \le \theta < 6\pi$.