EXAM 1 - MATH 131 Thursday, February 3

YOUR NAME:_____ George Voutsadakis

Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. The minute hand on the clock atop city hall measures 6 feet 3 inches from its tip to its axle.

   (a) Through what angle (in radians) does the minute hand pass between 9:12 AM and 9:48 AM?

   (b) What distance in feet does the tip of the minute hand travel during this period?

2. (a) Find the exact value of $\sin 30^\circ \cos 60^\circ + \tan 45^\circ$.

(b) Use the figure below to estimate the height of the given structure. (**Hint:** $\tan 46.3^\circ \cong 1.05$ and $\tan 65.5^\circ \cong 2.2$.)

3. Suppose $\sin\theta = -\frac{5}{7}$ and $\tan\theta > 0$.

   (a) Find $\sec\theta$.

   (b) Find $\cot\theta$.

4. Consider the expression

$$\frac{\sin\theta}{1+\cos\theta}+\frac{1+\cos\theta}{\sin\theta}.$$

(a) Perform the operations in the expression and simplify your answer.

(b) Given that $\frac{\pi}{2}<\theta<\pi$, write the answer of Part (a) as a function of $\cos\theta$ **only**.

5. Consider the function $y = 3\cos\left(\frac{\pi}{2}x\right)$.

   (a) Find the amplitude A and the period T of the function.

   (b) Sketch **carefully** the graph of the function in one full period.

   (c) State if the function has any symmetry and provide a general formula (involving an arbitrary integer k) for its x-intercepts.