PRACTICE EXAM 2 - MATH 140
DATE: Friday, September 29
INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. Each question is worth 5 points. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. Suppose that line L_1 passes through the points $(-2, 5)$ and $(3, -1)$.

   (a) Find the slope of L_1. (1 point)

   (b) Find an equation for the line L_1. (2 points)

   (c) Find the slope of the line L_2 that passes through $(0, 3)$ and is parallel to L_1. (1 point).

   (d) Find an equation of the line L_2. (1 point)

2. A 20-pound bag of Economy brand cement mix contains 25% cement and 75% sand. Additional cement is to be added to the mix to produce a higher quality mix with 40% cement.

   (a) Find how many pounds of cement and how many pounds of sand there are in the original mix. (1 point)

   (b) Suppose that x pounds of cement are to be added to the original mix. How many pounds of cement and how many pounds of sand will there be in the new mix? (1 point)

   (c) Set up an equation of the form (pounds of cement in new mix)/(total pounds in new mix) equals 40/100. (2 points)

   (d) Solve the equation to find how many pounds of cement should be added to produce the 40% mix.

3. (a) Use the quadratic formula to find the solutions of the equation $2x^2 + 5x + 3 = 0$. (2 points)

   (b) Without solving the equation $25x^2 - 20x + 4 = 0$ determine how many solutions it has. (1 point)

   (c) Use the substitution method to compute the roots of the equation $x^6 + 7x^3 - 8 = 0$. (2 points)

4. (a) Consider the parabola with equation $f(x) = -4x^2 + 8x + 1$. Do the following:
       i. Find its vertex and its opening direction. (1 point)
       ii. Find its x- and its y-intercepts; you are given that $\sqrt{5} \cong 2.2$. (1 point)
       iii. Roughly sketch its graph. (1 point)

   (b) Find the equation of the parabola with vertex $V = (5, -2)$ that goes through the point $(-1, 20)$. (2 points)

5. Solve the following quadratic inequalities:

   (a) $x(5x - 14) \geq 3$ (3 points)

   (b) $f(x) > g(x)$, where $f(x) = -x^2 + 4$ and $g(x) = -x - 2$. (2 points)