HOMEWORK 2 - MATH 111

DUE DATE: Monday, September 19
INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. Each question is worth 1 point. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. An aircraft on the Baltimore-Miami route has total expenses of $ 46,000 when loaded with 230 passengers, but the expenses are $ 40,000 when the plane has only 80 passengers.

   (a) Write an equation for the airline's total expenditure on the flight in relation to the number of passengers.

   (b) Write an equation for the number of passengers (P) that would cause the airline's total expenditure to be E dollars.

2. Solve the systems of equations by the substitution method:

$$\left\{ \begin{array}{rcrcr} x & + & y & = & 17 \\ 2x & - & y & = & 7 \end{array} \right\}, \quad \left\{ \begin{array}{rcl} y-3 & = & 2(x-4) \\ y-7 & = & 3(x-5) \end{array} \right\}$$

3. Scott and Eva paddled their canoe on the Sudbury river one afternoon to look at birds and wildlife. They started upriver and turned around after 45 minutes. The return trip took 30 minutes, and as they passed under Lee's bridge, Scott noticed that the current was flowing at about 8 inches per second. How many miles did they paddle? (Hint: Look for two equations in two unknowns that say "time·speed =distance".)

4. Graph the solution set of the following system of inequalities clearly depicting all critical points in your graph:

$$\left\{ \begin{array}{l} 6x + 8y \leq 480 \\ 5x + 4y \geq 100 \\ x \leq 60, y \leq 40 \\ x \geq 0, y \geq 0 \end{array} \right\}$$

5. Alice has a monthly budget of $ 40 for recreation. Suppose that she goes to a small rural college where the only kind of fun is going to a movie and eating out. A movie costs $ 5 and a dinner out costs $ 10. Write an inequality that shows what combinations of movies and dinners out per month she can afford and, then, sketch its graph.

6. Consider the following systems of inequalities:

$$\left\{ \begin{array}{l} x + y \geq 90 \\ 5x + 12y \geq 600 \\ 4x + 6y \geq 240 \\ x \geq 0, y \geq 0 \end{array} \right\}, \quad \left\{ \begin{array}{l} 30x + 20y \leq 1,200 \\ 40x + 50y \geq 2,000 \\ y \leq 2x + 10 \\ x \geq 0, y \geq 0 \end{array} \right\}$$

   Graph the solution sets, determine if the systems are inconsistent, determine if the solution sets are unbounded and identify the redundant constraints, if there are any.

7. Assume that every unit of the radios in inventory uses 1.6 square feet of space and every unit of clocks uses 0.7 square feet.

   (a) Write an inequality that says "The total inventory space that can be occupied by x units of radios plus the inventory space occupied by y units of the clocks must not be more than 500 square feet."

   (b) How much slack remains in the inventory space constraint if the warehouse currently has 180 units of radios and 250 units of clocks?

8. Use the Gauss-Jordan method to solve the following systems of equations in 3 variables:

$$\left\{\begin{array}{rcrcrcr} -3x & + & 3y & - & 5z & = & -6 \\ 2x & - & y & + & 2z & = & -1 \\ -x & + & 0y & + & 3z & = & 13 \end{array}\right\}, \quad \left\{\begin{array}{rcrcrcr} x & + & y & + & z & = & 3 \\ 2x & + & 3y & - & z & = & -2 \\ 3x & + & 0y & + & z & = & 0 \end{array}\right\}$$