Exam 2 **Precalculus Mathematics I**

Directions: Exam 2 is due Tuesday, November 1st by 8am. Answer all questions carefully. Do all steps with **brief explanations** similar to what was done in the examples in the notes. I prefer that you send your exams electronically. Your exams need not be typed. Follow this procedure:

1) On the course home page, click on Exam Dropboxes folder
2) Click on Exam II dropbox
3) Click Add Attachments
4) Click My Computer icon on the right to browse for a file to attach and select your exam file
5) Click Open then OK
6) You will see the attachment appear below the submission box
7) Click Submit to send it to the instructor

Before you do #3 read the note at the end of the exam.

1. (10 points) $2x + y = 7$
   $-2x + 3y = 5$

Also, verify your result by graphing the system of equations given in #14.

2. a. A sweater cost a dealer $32.00. At what price should he mark the sweater so he can give a discount of 25% and still make a mark-up profit of 20%? What is the final price if there is a 5% sales tax?

   b. Two people set out simultaneously from two locations 12 miles apart and walk toward each other. One person walks 5 miles an hour faster than the other. Find the rate of speed of each person if they meet in one hour and ten minutes.

3. x^2 + x - 30 = 0

(b) Determine the vertex of the parabola $y = x^2 + x - 30$.

(c) Sketch the graph of $y = x^2 + x - 30$ using the information you found in parts a and b.

4. (10 points) How high will a baseball that is thrown up into the air at 48 feet per second go if it starts its flight at a height 10 feet above the ground?

5. (25 points)

(a) Solve $-5 <= 3x + 1 <= 3$ for x. Express your answer using a line graph and in interval notation.

Solve the following inequalities. Express your answer using interval notation

(b) A person has two choices for his salary. Plan A. A salary of $900 per month plus a commission of 10% of sales OR Plan B A salary of $1,200 per month plus a commission of 15% of sales in excess of $8,000. For what amount of monthly sales is plan B better than plan A?

(c) Solve $|x - 3| = 4$ for x

(d) Sketch the graph of the function y = | x - 3 | and use it to verify your solution of part c.

6. (10 points)

Use the quadratic formula to determine the roots of the equation $-x^2 + 4x + 6 = 0$ to the nearest tenth.

7. (10 points) A rain gutter is to be made up of rectangular aluminum sheets 12 inches wide by turning up the sides edges 90 degrees. What depth (of the edges) will provide a **maximum cross sectional area** and thereby provide for the greatest flow of water? (Hint, think of quadratic equations and that you want to maximize the area.)

Extra.

Find the maximum or minimum value of the given quadratic function on the interval that is specified.

Minimize f(x) = x^2- 1 Interval = [-1, 3]

Note:

Read sections 3.2, 3.3 and 3.5 carefully. These (and other) sections illustrate the power of the quadratic function in solving a variety of problems. To understand this function you must be able to graph it.

Some key thoughts:

(a) Any function of the form $y = ax^2 + bx + c$ where $a \neq 0$ is a quadratic.

(b) The formula $x = \frac{-b}{2a}$ gives you the x value of the vertex. Substitute this value in the equation (of part) to find the y value.

(c) To sketch the graph of a quadratic one frequently need only know the vertex (x and y values) and the roots (found by solving $ax^2 + bx + c = 0$ by factoring or by using the quadratic formula).

(d) The quadratic formula is: $y = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$