Demonstrate your knowledge by giving clear, concise solutions to each problem. Be sure to include all relevant drawings and justify your answers (show all your work). You may show your solution in more than one way to investigate beyond the requirements of the problem.

1. One way to factor a trinomial such as $x^2 - 2x - 3$ is to assign a value such as 10 to and evaluate the expression. **(5 pts)**

$$x^2 - 2x - 3 = 10^2 - 2(10) - 3$$
$$= 100 - 20 - 3$$
$$= 77$$

A factorization of 77 is 7×11. Since $x = 10, 7 = (x - 3)$ and $11 = (x + 1)$. Multiply to see if $(x - 3)(x + 1) = x^2 - 2x - 3$.

(5 pts)a. Try the above method to factor $x^2 - 8x + 15$. Show your work and explain each step did the method give you the correct factors?

(5 pts)b. Try the above method to factor $x^2 - 2x - 8$. Why is it difficult to find the correct factors for this trinomial using this method?

(5 pts)c. Evaluate the expression in part b for x=7 . Then use the above method to find the factors. Explain each step. Remember in finding your factors that x=7.

2. **(5 pts)**a. Tell how to factor a polynomial with four terms by grouping.

(5 pts)b. Use grouping to factor $10ax - 5ay + 2bx - by$. Explain each step.

(5 pts)c. Factor $6x^3 + 3x^2y - 2xy - y^2$ in two different ways. Show all your work.

3. (5 pts) a. Write a word problem involving finding two real numbers that could be solved with the

equation x(9-x)=14 .

(5 pts)b. Determine what the axis of symmetry and the maximum or minimum point of the graph of the

equation would be without graphing the equation.

(5 pts)c. Show how to solve the equation by graphing.

(5 pts)d. Verify your answer in part c by solving using two other methods.