Place your name on the back of this sheet of paper and nowhere else. Staple your answers on the front of this sheet of paper. Failure to follow these directions will cost you 1 point. If you use double-sided printing or print on the back of scrap paper, I will give you one additional point.

Because I will not be in class on 4/1, we will make up that missing class by having a half hour longer class on both 3/29 and 3/31. Therefore, there will be no break between classes that week.

Show all calculations and all work on all questions.

1) (10 points) Find X & Y such that $\begin{bmatrix} 5 & 2 & 7 \\ X & 3 & 8 \\ Y & 5 & 1 \end{bmatrix} = \begin{bmatrix} X+Y & 2 & 7 \\ Y+3 & 3 & 8 \\ X-3 & 5 & 1 \end{bmatrix}$

2) (10 points) Suppose the prices of boots, coats, and hats are $20, $30, and $15 respectively. The quantity of each sold are 25, 40, and 10 respectively. Set this up as matrix multiplication. Then do the multiplication and find the total revenue.

3) (20 points) Suppose 30% of people in Bethany at the start of the year move to Pittsburgh, 10% move to Wheeling, and the rest stay in Bethany. Of those who start in Wheeling, 5% move to Bethany, 20% move to Pittsburgh, and the rest stay still. Of those who start in Pittsburgh, 1% move to Bethany, 3% move to Wheeling, and the rest stay where they are. Set up the matrix for determining the future population. <u>Briefly</u> explain how you got it. If we start with 1000 people in each location, find the number of people in each location after one year and after two years.

4) (15 points) Suppose $1 of food requires $.30 of food, $.10 of materials, and $.20 of energy. $1 worth of materials requires $.25 of food, $.15 of materials, and $.40 of energy. $1 worth of energy uses $.05 worth of food, $.30 worth of materials, and $.50 worth of energy. Set up the input-output matrix. <u>Briefly explain</u> how you got it. If you wanted to produce $1000 worth of each, then how much of each would be used up? Answer this question by doing matrix multiplication.

5) For the following questions, use the matrices below and do the operations asked for:

$A = \begin{bmatrix} -3 & 4 & -2 \\ 2 & 10 & -5 \\ 1 & 0 & 3 \end{bmatrix}, B = \begin{bmatrix} 2 & 5 & -1 \\ 4 & 0 & 5 \\ 6 & 1 & 2 \end{bmatrix}, C = \begin{bmatrix} 4 \\ 5 \\ 1 \end{bmatrix}, D = \begin{bmatrix} 10 & -1 & 2 \end{bmatrix}$

A) (5 points) A+B
B) (25 points) Prove AB≠BA
C) (10 points) DB
E) (10 points) AC
F) (5 points) DC