

Your Name: _____

There are five problems on this exam.

Write your answers to the problems in the spaces provided. If you must continue an answer somewhere other than immediately after the problem statement, be sure (a) to tell where to look for the answer, and (b) to label the answer wherever it winds up. In any case, be sure to circle your final answer to each problem.

You may refer to notes you have brought in on one sheet of paper, as announced in class.

BE SURE TO SHOW YOUR WORK: YOU MAY RECEIVE REDUCED OR ZERO CREDIT FOR UNSUBSTANTIATED ANSWERS.

Problem 1

Find all solutions to the equations represented by the augmented matrix

$$\left[\begin{array}{cccc|c} 1 & 0 & -1 & 0 & -3 \\ 0 & 1 & 2 & 0 & 4 \\ 0 & 0 & 0 & 1 & 5 \end{array} \right].$$

Problem 2

Solve the equations

$$\begin{aligned} x + y + z &= 7 \\ 2x - y - 7z &= 8 \\ 3x - 6z &= 15. \end{aligned}$$

Problem 3

Find the inverse, if it exists, of the matrix

$$\left[\begin{array}{ccc} 2 & -1 & -2 \\ 3 & 1 & 0 \\ 1 & 1 & 1 \end{array} \right].$$

Problem 4

Find the minimum value of $3y + x$ on the set bounded by the inequalities

$$\begin{aligned} y - 6 &\leq 0 \\ 2 - y &\leq 0 \\ 6 - x - y &\leq 0 \\ y - x - 4 &\leq 0. \end{aligned}$$

Problem 5

Your business makes stuffed Badgers and stuffed Gophers. Each Badger requires 100 square inches of fabric and 30 ounces of stuffing. Each Gopher requires 300 square inches of fabric and 20 ounces of stuffing. For each Badger you produce, you make a profit of \$16. Each Gopher brings in a profit of \$20. For each day's production you have available 6000 ounces of stuffing and 30,000 square inches of fabric. How many Badgers and how many Gophers should you make each day in order to maximize profit?