

DO NOT TURN THIS PAGE UNTIL YOU ARE INSTRUCTED TO DO SO

- ❖ Write your name below on the space provided.
- ❖ This test has a total of 5 pages. The last page is a formula sheet. Feel free to tear that page off. It does not have to be returned.
- ❖ Work the problem in the space provided. If you need more space, write on the back of the test.
- ❖ To insure maximum credit, show your work. In general, full credit will not be given for unsupported answers.
- ❖ Look only at your test. Don't give the impression that you are cheating.
- ❖ Give the turkey on the last page a name for something extra.
- ❖ Be sure to write neatly and in pencil. If I cannot read what was written, do not expect the problem to be graded.
- ❖ If you finish early, go over the test again.

Good luck!

Number	Maximum	Score
1	16	
2	1	
3	8	
4	8	
5	4	
6	12	
7	4	
8	18	
9	18	
10	11	
Total	100	

Name \_\_\_\_\_

*Circle Final Answers*

This font be crazy fancy



1) (8 points each) Solve the system using the methods listed below. Write answer as an ordered triple.

a) The Elimination method:

$$\begin{cases} -3x - y + 3z = 25 \\ x - 7y + 5z = 3 \\ 4x - 2y + 3z = 6 \end{cases}$$

b) Gauss-Jordan method:

2) (1 point) Verify that you made absolutely sure that your answer to 1a is the same as in 1b by signing your name here \_\_\_\_\_ . You will not receive the credit if the work does not support the same answer.

3) (4 points each) The following systems are special cases. Mark your answer as either “no solution” or “infinitely many solutions” and show supporting work. You may use Elimination or Gauss-Jordan to determine the special case.

a) 
$$\begin{cases} 2x + 8y = -4 \\ -6x - 24y = 12 \end{cases}$$

b) 
$$\begin{cases} 5x + y + 2z = 4 \\ x + 4y - z = 8 \\ 8x - 6y + 6z = 0 \end{cases}$$

4) For the following problem:

In a certain country people own a total of about 353 million fish, cats, and dogs as pets. The number of fish owned is 7 million more than the total number of cats and dogs owned, and 16 million more cats are owned than dogs. How many of each type of pet do people in this country own?

a) (3 points) Name and define your variables for this problem:

b) (5 points) Set up **BUT DO NOT SOLVE** a system of equations for this problem:

5) (2 points each) For the matrix:  $A = \begin{bmatrix} -3 & 6 \\ 0 & 14 \\ 8 & 9 \\ 7 & 12 \end{bmatrix}$ , determine...

a) The dimension of matrix  $A$

b) The 3,1 entry

6) (4 points each) For the following matrices:

$$A = \begin{bmatrix} 6 & 1 & 7 \end{bmatrix}$$

$$B = \begin{bmatrix} 6 & -2 & 4 \\ 1 & 12 & 1 \end{bmatrix}$$

$$C = \begin{bmatrix} -1 & 0 & 9 \\ 5 & 7 & 7 \end{bmatrix}$$

$$D = \begin{bmatrix} -2 & 8 \\ 5 & 12 \\ 3 & 4 \end{bmatrix}$$

Find the following or explain why they do not exist:

a)  $5C - 3B$

b)  $AD$

c)  $7B + 4D$

7) (2 points each) What property must be true to...

a) Add or subtract matrices?

b) Multiply matrices?

8) (6 points each) The manager at CoffeeMe orders 200 lbs of Peru La Florida beans, 150 lbs of Nicaragua Segovia beans, and 175 lbs of the Ethiopia Yirgacheffe beans for one week.

a) Create a  $1 \times 3$  matrix  $A$  that represents the amount of each type of coffee ordered for the week. Be sure to label the rows and columns. Abbreviations are acceptable.

b) The following week, the manager increases his order by 20%. Find a matrix  $B$  that represents this order. Be sure to label the rows and columns. Abbreviations are acceptable.

c) Find the matrix  $A + B$  and interpret each value.

9) (6 points each) Megan supplies two coffee shops with homemade cookies: chocolate chip, oatmeal, peanut butter, and dessert rose. The table shows the number of each type of cookie, in dozens, that Megan sold in one week. She spends \$4 for the ingredients for one dozen of chocolate chip, \$3.50 for the ingredients of one dozen of oatmeal cookies, \$3.75 for one dozen peanut butter cookies, and \$5.50 for one dozen of dessert rose cookies.

	CoffeeMe	Little Bird Café
Chocolate Chip	8	15
Oatmeal	6	10
Peanut Butter	5	3.5
Dessert Rose	9	9

a) Write the information of the table as a  $4 \times 2$  matrix  $S$ . Be sure to label the rows and columns. Abbreviations are acceptable.

b) Write a row matrix  $C$  that represents the cost per dozen for the ingredients. Be sure to label the rows and columns. Abbreviations are acceptable.

c) Find the matrix  $CS$  and interpret each entry.

10) (8 points part *a*; 3 points part *b*) For the system 
$$\begin{cases} x - y + z = 3 \\ x - 2y = -5 \quad \dots \\ 5x - 6y + 3z = 0 \end{cases}$$

a) Find the inverse of the coefficient matrix algebraically using the Gauss-Jordan Method:

b) Solve the system using the matrix inverse from part *a*. Write answer as an ordered triple.

