

Name: _____

Instructor:

Exam 3

SOLVE 10 QUESTIONS OUT OF 12

1. Solve the system of linear equations using the Gauss-Jordan elimination method.

$$\begin{aligned}5x + 3y &= 9 \\ -2x + y &= -8\end{aligned}$$

2. Michael Perez has a total of \$2,000 on deposit with two savings institutions. One pays interest at the rate of 6% year, whereas the other pays interest at the rate of 8% year. If Michael earned a total of \$144 in interest during a single year, how much does he have on deposit in each institution?

3. Solve the system of linear equations, using the Gauss-Jordan elimination method.

$$3x - 2y = 5$$

$$\begin{aligned} -x + 3y &= -4 \\ 2x - 4y &= 6 \end{aligned}$$

4. Perform the indicated operation.

$$3 \begin{bmatrix} 1 & 1 & -3 \\ 3 & 2 & 3 \\ 7 & -1 & 6 \end{bmatrix} + 4 \begin{bmatrix} -2 & -1 & 8 \\ 4 & 2 & 2 \\ 3 & 6 & 3 \end{bmatrix}$$

5. Compute the indicated product

$$\begin{bmatrix} -1 & 2 \\ 4 & 3 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} 2 & 1 & 2 \\ 3 & 2 & 4 \end{bmatrix}$$

6. Bond Brothers, a real estate developer, builds houses in three states. The projected number of units of each model to be built in each state is given by the matrix

$$A = \begin{array}{c} NY \\ CT \\ MA \end{array} \begin{array}{cccc} I & II & III & IV \\ \begin{bmatrix} 60 & 80 & 120 & 40 \\ 20 & 30 & 60 & 10 \\ 10 & 15 & 30 & 5 \end{bmatrix} \end{array}$$

The profits to be realized are \$20,000, \$22,000, \$25,000, and \$30,000, respectively, for each model I, II, III, and IV house sold.

- Write a column matrix B representing the profit for each type of house.
- Find the total profit Bond Brothers expects to earn in each state if all the houses are sold.

7. Find the inverse of the matrix, if it exists. Verify your answer.

$$\begin{bmatrix} 3 & 1 \\ 4 & 2 \end{bmatrix}$$

8. The Campus Bookstore's inventory of books is

Hardcover: textbooks, 5280; fiction, 1680; nonfiction, 2320; reference, 1890

Paperback: fiction, 2810; nonfiction, 1490; reference, 2070; textbooks, 1940

The College Bookstore's inventory of books is

Hardcover: textbooks, 6340; fiction, 2220; nonfiction, 1790; reference, 1980

Paperback: fiction, 3100; nonfiction, 1720; reference, 2710; textbooks, 2050

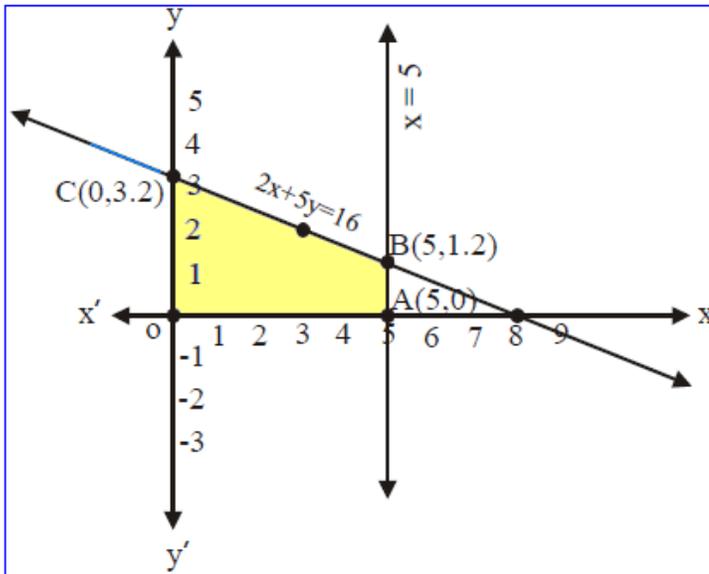
- Represent Campus's inventory as a matrix A.
- Represent College's inventory as a matrix B.
- The two companies decide to merge, so now write a matrix C that represents the total inventory of the newly amalgamated company.

9. Determine graphically the solution set for the system of inequalities and indicate whether the solution set is bounded or unbounded.

$$\begin{aligned}x + y &\leq 4 \\2x + y &\leq 6 \\2x - y &\geq -1 \\x &\geq 0, \quad y \geq 0\end{aligned}$$

10. Find the maximum and/or minimum value(s) of the objective function on the feasible set S.

$$Z = 3x + 4y$$



11. Solve the linear programming problem by the method of corners.

$$\text{Minimize } C = 2x + 10y$$

$$\text{Subject to } 5x + 2y \geq 40$$

$$x + 2y \geq 20$$

$$y \geq 3, x \geq 0$$

12. A farmer plans to plant two crops, A and B. The cost of cultivating crop A is \$40/acre whereas that of crop B is \$60/acre. The farmer has a maximum of \$7400 available for land cultivation. Each acre of crop A requires 20 labor-hours, and each acre of crop B requires 25 labor-hours. The farmer has a maximum of 3300 labor-hours available. If she expects to make a profit of \$150/acre on crop A and \$200/acre on crop B, how many acres of each crop should she plant in order to maximize her profit? What is the optimal profit?