

## Math 1130 Exam 3 Review

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

1) \_\_\_\_\_

Solve the following system algebraically: 
$$\begin{cases} 2x - y + 3z = 12 \\ x + y - z = -3 \\ x + 2y - 3z = -10 \end{cases}$$

2) \_\_\_\_\_

A manufacturer produces two products, A and B. For each unit of A sold the profit is \$8. For each unit of B sold the profit is \$11. From past experience it has been found that 25 percent more of A can be sold than of B. Next year the manufacturer desires a total profit of \$42,000. How many units of each product must be sold?

3) \_\_\_\_\_

A nut shop packages mixtures of different nuts for sale. From peanuts, cashews and almonds, the owner wants to prepare a mixture which will sell for \$4.45 for a 1 pound bag. The cost per pound of these nuts is \$1.50, \$6.00, and \$4.00, respectively. The amount of peanuts is to be three times the amount of almonds. How much of each type of nut will be in the final blend?

4) \_\_\_\_\_

A manufacturer sells his product at \$12.50 per unit, selling all he produces. His fixed cost is \$5,000 and his variable cost per unit is \$8.50. (a) At what level of production will he break even? (b) At what level of production will he have a profit of \$10,000?

5) \_\_\_\_\_

Find the equilibrium point if the demand equation for a product is  $p = \frac{q}{20} - 3$  and the supply equation is  $p = \frac{80}{q}$ .

6) \_\_\_\_\_

Find the Break Even Point for a product whose Total Revenue,  $y_{TR}$ , (in \$) and Total Cost,  $y_{TC}$ , (in \$) are as follows:

$$y_{TR} = (10q - 25)q$$
$$y_{TC} = 2000 + 75q$$

7) \_\_\_\_\_

If  $A = \begin{bmatrix} 1 & 6 & 0 & 4 \\ 2 & 3 & 1 & 0 \\ 4 & 7 & 2 & 8 \end{bmatrix}$ , determine (a)  $a_{32}$ , and (b) the order of  $A$ .

8) \_\_\_\_\_

Solve the matrix equation: 
$$\begin{bmatrix} x & y - 1 \\ 5 & 2x \end{bmatrix} = \begin{bmatrix} 2y & 4 \\ 5 & 2x \end{bmatrix}$$

9) \_\_\_\_\_

Find the transpose of the matrix: 
$$\begin{bmatrix} 1 & 3 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

10)

Perform the indicated operations and simplify your answer:  $\begin{bmatrix} 3 & -1 \\ 4 & 2 \\ 6 & -8 \end{bmatrix} + 2 \begin{bmatrix} 4 & -1 \\ 0 & 5 \\ -4 & 3 \end{bmatrix}$

10) \_\_\_\_\_

11) If  $\mathbf{A} = \begin{bmatrix} 1 & 2 & 3 \\ 3 & 4 & 5 \end{bmatrix}$ ;  $\mathbf{B} = \begin{bmatrix} 2 & -1 & -2 \\ 1 & -3 & -2 \end{bmatrix}$ , then find  $(\mathbf{A} + \mathbf{B})^T$ .

11) \_\_\_\_\_

12)

Solve the matrix equation:  $x \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} + 2 \begin{bmatrix} 3 \\ 5 \\ 1 \end{bmatrix} + y \begin{bmatrix} 0 \\ 3 \\ 0 \end{bmatrix} = \begin{bmatrix} 4 \\ 3 \\ x - y - 3 \end{bmatrix}$

12) \_\_\_\_\_

13) If  $A = \begin{bmatrix} -8 & 3 \\ 2 & 1 \\ 1 & -7 \end{bmatrix}$  and  $B = \begin{bmatrix} 5 & 2 \\ -2 & 9 \\ 4 & -3 \end{bmatrix}$ , find  $2A - 3B$ .

13) \_\_\_\_\_

14) If  $A = \begin{bmatrix} -8 & 3 \\ 2 & 1 \\ 1 & -7 \end{bmatrix}$ ,  $B = \begin{bmatrix} 5 & 2 \\ -2 & 9 \\ 4 & -3 \end{bmatrix}$ , and  $C = \begin{bmatrix} 7 & -1 \\ 5 & -2 \\ 3 & -3 \end{bmatrix}$ , find  $7A + 6B - 3C$ .

14) \_\_\_\_\_

15) Perform the indicated operations and simplify your answer:  $2 \begin{bmatrix} 3 \\ 1 \end{bmatrix} - \begin{bmatrix} 1 & 2 \\ -3 & 0 \end{bmatrix} \begin{bmatrix} 1 \\ 0 \end{bmatrix}$

15) \_\_\_\_\_

16) Let  $\mathbf{A} = \begin{bmatrix} 1 & 1 \\ 2 & -1 \end{bmatrix}$ ;  $\mathbf{B} = \begin{bmatrix} 3 & -5 \\ -9 & 2 \end{bmatrix}$ ;  $\mathbf{C} = \begin{bmatrix} -2 & 2 \\ 4 & -1 \end{bmatrix}$ . Find  $\mathbf{A}[\mathbf{B} + 2\mathbf{C}]$

16) \_\_\_\_\_

17) The prices (in dollars per case) for 3 types of pens are represented by the price vector:  $\mathbf{P} = [99 \ 79 \ 109]$ . An office supply store orders cases of these pens in the quantities given by

17) \_\_\_\_\_

the column vector:  $\mathbf{Q} = \begin{bmatrix} 5 \\ 3 \\ 6 \end{bmatrix}$ . Find the total cost (in dollars) of the purchase.

## Answer Key

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1)  $x = 1, y = -1, z = 3$

2) 2500 units of A, 2000 units of B

3) 0.3 lb of peanuts; 0.6 lb of cashews; 0.1 lb of almonds

4) (a) 1,250 units      (b) 3,750

5)  $p = 1; q = 80$

6) Break Even Point is: (20 units, \$3,500)

7) (a) 7                      (b)  $3 \times 4$

8)  $x = 10, y = 5$

9)  $\begin{bmatrix} 1 & 4 & 7 \\ 3 & 5 & 8 \\ 3 & 6 & 9 \end{bmatrix}$

10)  $\begin{bmatrix} 11 & -3 \\ 4 & 12 \\ -2 & -2 \end{bmatrix}$

11)  $\begin{bmatrix} 3 & 4 \\ 1 & 1 \\ 1 & 3 \end{bmatrix}$

12)  $x = -2, y = -1$

13)  $\begin{bmatrix} -31 & 0 \\ 10 & -25 \\ -10 & -5 \end{bmatrix}$

14)  $\begin{bmatrix} -47 & 36 \\ -13 & 67 \\ 22 & -58 \end{bmatrix}$

15)  $\begin{bmatrix} 5 \\ 5 \end{bmatrix}$

16)  $\begin{bmatrix} -2 & -1 \\ -1 & -2 \end{bmatrix}$

17)  $\mathbf{PQ} = \begin{bmatrix} 99 & 79 & 109 \end{bmatrix} \begin{bmatrix} 5 \\ 3 \\ 6 \end{bmatrix} = \begin{bmatrix} 1386 \end{bmatrix}$