Algebra 3 Part 1: Non-graphing calculator Name KEY

Rev II Chapter 2 Date Per.

The following problems are to be completed without the use of a graphing calculator. Be sure to show enough work so that I can reproduce your results if necessary.

Solve the systems algebraically (elimination). Write your solutions as ordered pairs or ordered triples.

1. $2(4x + 2y = 6)$
$3x - 4y = -12$
$8x + 4y = 12$
$11x = 0$
$x = 0$
$4(0) + 2y = 6$
$y = 3$

1. (0, 3)

2. $2x + y + 3z = 8$
$x + 2y - 2z = 3$
$-3(5x + y + z = 1)$

$2x + y + 3z = 8$
$-15x - 3y - 3z = -3$
$2(-13x - 2y = +5)$

$x + 2y - 2z = 3$
$10x + 2y + 2z = 2$
$11x + 4y = 5$
$-26x - 4y = +10$
$-15x = +15$, $x = -1$

$11(-1) + 4y = 5$
$4y = 16$
$y = 4$

$-1 + 2(4) - 2z = 3$
$7 - 2z = 3$
$-2z = -4$
$z = 2$

2. (−1, 4, 2)

Find the value of the determinant.

$0 - 8 + 6 = -2$

3. $\begin{vmatrix} 4 & -1 & 6 \\ -3 & 0 & 1 \\ 5 & -2 & 2 \end{vmatrix} \begin{matrix} 4 & -1 \\ -3 & 0 \\ 5 & -2 \end{matrix}$ $31 + 2$

$0 - 5 + 36 = 31$

3. 33

4. Find the inverse of each matrix if it exists. If there is no inverse write "singular".

a. $\begin{bmatrix} 3 & 2 \\ -5 & -4 \end{bmatrix}$ $-12 + 10 = -2$

$-\frac{1}{2}\begin{bmatrix} -4 & -2 \\ 5 & 3 \end{bmatrix}$

b. $\begin{bmatrix} -4 & 2 \\ 8 & -4 \end{bmatrix}$ $16 - 16 = 0$

4a. $-\frac{1}{2}\begin{bmatrix} -4 & -2 \\ 5 & 3 \end{bmatrix} = \begin{bmatrix} 2 & 1 \\ -\frac{5}{2} & -\frac{3}{2} \end{bmatrix}$

b. Singular

5. Find the values for x, y and z for which $\begin{bmatrix} x & -4y \\ 2z-x & 12 \end{bmatrix} = \begin{bmatrix} 3+2x & 2 \\ 23 & z-4y \end{bmatrix}$ is true. Write your answer as an ordered triple.

$x = 3 + 2x$ +1
$-2x \quad -2x$
$-x = 3$
$x = -3$ +1

$-4y = 2$ +1
$\frac{-4y}{-4} = \frac{2}{-4}$
$y = -\frac{1}{2}$ +1

$2z - x = 23$ +1
$2z + 3 = 23$
$-3 \quad -3$
$2z = 20$
$z = 10$ +1

6

5. $\left(-3, -\frac{1}{2}, 10\right)$

6. Use a determinant to find the equation of a line in standard form through the points (– 4, 3), and (2, 1).

Set-up = 2 pts

$6 + x - 4y$ +1

$$\begin{vmatrix} x & y & 1 \\ -4 & 3 & 1 \\ 2 & 1 & 1 \end{vmatrix} \begin{matrix} x & y \\ -4 & 3 \\ 2 & 1 \end{matrix}$$

$3x + 2y - 4$

$3x + 2y - 4 - (6 + x - 4y) = 0$
$3x + 2y - 4 - 6 - x + 4y$
$2x + 6y - 10 = 0$

–4 if no determinant

5

6. $2x + 6y - 10 = 0$

7. Determine if the points A (– 3, – 5), B (6, 1), and C (10, 2) are collinear by using a <u>determinant</u> (circle the appropriate response). If they are <u>not</u> collinear, use the value of your determinant to find the <u>area</u> of the triangle created by the non-collinear points.

Set-up 2 pts

$10 - 6 - 30 = -26$ +1

$$\begin{vmatrix} -3 & -5 & 1 \\ 6 & 1 & 1 \\ 10 & 2 & 1 \end{vmatrix} \begin{matrix} -3 & -5 \\ 6 & 1 \\ 10 & 2 \end{matrix}$$

$-41 + +26$

25

$-3 - 50 + 12 = -41$ +1
$-53 + 12$

6

7. collinear? __Yes____ No (circled) +1

Area +1 $\frac{15}{2}$ = ~~[illegible]~~ $7\frac{1}{2}\,u^2$

–5 if no column of 1's

Part 2 – Graphing Calculator.

The following problems may be completed with the use of a graphing calculator. Be sure to show enough work so that I can reproduce your results if necessary.

1. Use matrices $A = \begin{bmatrix} -3 & -2 \\ 0 & 5 \\ 6 & -1 \end{bmatrix}$, $B = \begin{bmatrix} 8 & 6 \\ -5 & 4 \\ 3 & -1 \end{bmatrix}$, and $C = \begin{bmatrix} -3 & 2 & 1 \\ 0 & 5 & -6 \end{bmatrix}$ to evaluate each expression. If the matrix does not exist, write "not possible".

a) $-2B + A$ $\quad \begin{bmatrix} -16 & -12 \\ 10 & -8 \\ -6 & 2 \end{bmatrix} + \begin{bmatrix} -3 & -2 \\ 0 & 5 \\ 6 & -1 \end{bmatrix}$

1a. $\begin{bmatrix} -19 & -14 \\ 10 & -3 \\ 0 & 1 \end{bmatrix}$

b) CA $\quad \begin{bmatrix} -3 & 2 & 1 \\ 0 & 5 & -6 \end{bmatrix} \begin{bmatrix} 3 & -2 \\ 0 & 5 \\ 6 & -1 \end{bmatrix} = \begin{bmatrix} 15 & 15 \\ -36 & 31 \end{bmatrix}$

b. $\begin{bmatrix} 15 & 15 \\ -36 & 31 \end{bmatrix}$

c) AB

c. not possible

Sizes are not compatible.

2. Solve the system by using a matrix equation.

$3x + 2y = 5$

$5x + 4y = 7$

$A = \begin{bmatrix} 3 & 2 \\ 5 & 4 \end{bmatrix}$ $\quad 12 - 10 = 2$

$A^{-1} = \frac{1}{2}\begin{bmatrix} 4 & -2 \\ -5 & 3 \end{bmatrix}$ $\quad X = \begin{bmatrix} x \\ y \end{bmatrix}$ $\quad B = \begin{bmatrix} 5 \\ 7 \end{bmatrix}$

2. $\begin{bmatrix} 3 \\ -2 \end{bmatrix}$ $\quad (3, -2)$

3. Find the maximum and minimum values of the function for the polygonal convex set determined by the given system of inequalities. Be sure to list your vertex points and show that you've tested them.

$y \geq 2$

$x \geq 1$

$x \leq 6 - y$

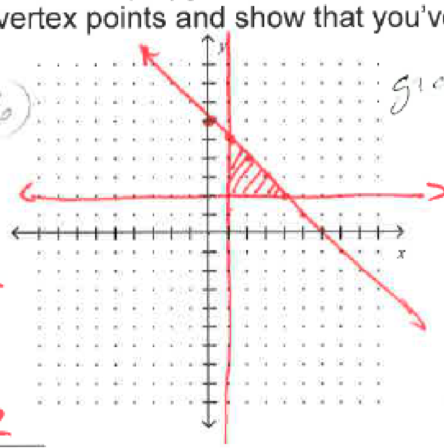
$y \leq -x + 6$

f(x,y) = 2x – y + 1

$(1,2) = 2(1) - 2 + 1 = 1$

$(4,2) = 2(4) - 2 + 1 = 7$

$(1,5) = 2(1) - 5 + 1 = -2$



Maximum = (4, 2) ; 7 Minimum = (1, 5) ; -2

4. Woof, a dog food manufacturer, wants to advertise both in a magazine and on radio. The magazine charges $100 per ad and requires the purchase of at least three ads. The radio station charges $200 per commercial minute and requires the purchase of at least 4 minutes. Each magazine ad reaches 12,000 people while each commercial minute reaches 16,000 people. Woof can spend at most $1300 on advertising. How many ads and commercial minutes should the manufacturing company purchase to reach the most people?

x= # of magazine ads y = commercial minutes

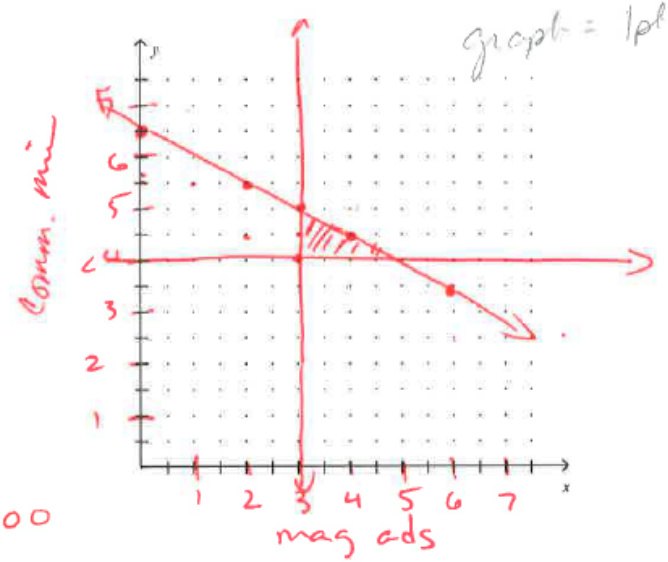
Inequalities:

$x \geq 3$
$y \geq 4$

$100x + 200y \leq 1300$

$\frac{200y}{200} \leq -\frac{100x}{200} + \frac{1300}{200}$

$y \leq -\frac{1}{2}x + 6.5$



People reached:

f(x, y)= $12{,}000x + 16{,}000y$

$(3,4) = 12{,}000(3) + 16{,}000(4) = 100{,}000$

$(5,4) = 12{,}000(5) + 16{,}000(4) = 124{,}000$

$(3,5) = 12{,}000(3) + 16{,}000(5) = 116{,}000$

(8) 5. Ads 5 commercials 4

Max people 124,000

-3 wrong because of constraints -2 if wrong but got constraints right

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