FILL IN THE BLANKS. **SCORE: _____ / 3 PTS**

If matrix A has 4 rows, matrix B has 5 columns, matrix C has 3 rows, and $B = CA$, then

the order of matrix A is 4×5, the order of matrix B is 3×5, the order of matrix C is 3×4,

---

Sketch the solution and find the vertices of the following system of inequalities. **SCORE: _____ / 5 PTS**

<u>Your sketch does NOT need to be to scale.</u>

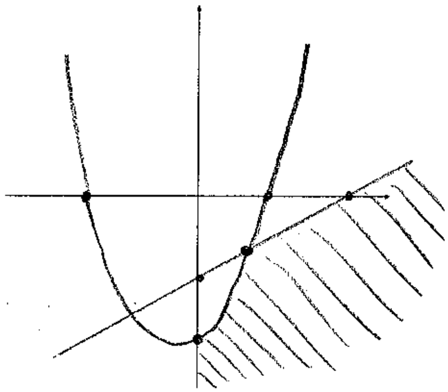
TEST (0,0)

				X-INT	Y-INT
NO	$y < x^2 + 2x - 24$		$y = (x+6)(x-4)$	$-6, 4$	-24
NO	$2x - y \geq 15$		$y = 2x-15$	$7\frac{1}{2}$	-15
$Q_{1,4}$	$x > 0$		y - AXIS		

$2x-15 = x^2+2x-24$

$9 = x^2$

$x = \pm 3$



VERTICES:

$(0, -24)$

$(3, -9)$

Find $\begin{vmatrix} -2 & 5 & -1 & -4 & 3 \\ 1 & 4 & -3 & 0 & -2 \\ 3 & -2 & 4 & 0 & -1 \\ -4 & -3 & 2 & 1 & 4 \\ 0 & 2 & 0 & 0 & 0 \end{vmatrix}$. (HINT: The answer is between -50 and 50.) **SCORE: _____ / 5 PTS**

$$= -2 \begin{vmatrix} -2 & -1 & -4 & 3 \\ 1 & -3 & 0 & -2 \\ 3 & 4 & 0 & -1 \\ -4 & 2 & 1 & 4 \end{vmatrix} = -2\left(-4 \begin{vmatrix} 1 & -3 & -2 \\ 3 & 4 & -1 \\ -4 & 2 & 4 \end{vmatrix} - 1 \begin{vmatrix} -2 & -1 & 3 \\ 1 & -3 & -2 \\ 3 & 4 & -1 \end{vmatrix}\right)$$

$$= -2(-4(16-12-12-(-36-2+32)) - (-6+6+12-(1+16-27)))$$

$$= -2(-4(-2)-(22)) = -2(-14) = 28$$

Bo & Lee eat at a breakfast bar which offers 3 items: milk, eggs and bread. Each carton of milk has $12g$ carbohydrates and $8g$ protein. Each egg has $1g$ carbohydrates and $9g$ protein. Each slice of bread has $18g$ carbohydrates and $4g$ protein. Bo consumes 2 cartons of milk, 3 eggs and 1 slice of bread. Lee consumes 1 carton of milk, 2 eggs and 3 slices of bread. **SCORE: _____ / 5 PTS**

[a] Write matrices A and B such that the matrix product AB gives the number of grams of carbohydrates and protein consumed by each person.

BO CARB $2(12)+3(1)+1(18)$ PROT $2(8)+3(9)+1(4)$

LEE CARB $1(12)+2(1)+3(18)$ $1(8)+2(9)+3(4)$

$$A = \begin{bmatrix} 2 & 3 & 1 \\ 1 & 2 & 3 \end{bmatrix} \qquad B = \begin{bmatrix} 12 & 8 \\ 1 & 9 \\ 18 & 4 \end{bmatrix}$$

[b] Find BA. (NOTE: This matrix product has no meaning.)

$$\begin{bmatrix} 12 & 8 \\ 1 & 9 \\ 18 & 4 \end{bmatrix}\begin{bmatrix} 2 & 3 & 1 \\ 1 & 2 & 3 \end{bmatrix} = \begin{bmatrix} 32 & 52 & 36 \\ 11 & 21 & 28 \\ 40 & 62 & 30 \end{bmatrix}$$

Using Gauss-Jordan elimination as shown in lecture, solve the following system of linear equations. **SCORE: _____ / 5 PTS**

You must produce a matrix in reduced row echelon form (RREF) as part of your solution. (You do NOT need to check your answer.)

$$\begin{aligned} 2x-5y+4z &= -1 \\ -3x+7y-6z &= 0 \\ -x+2y-2z &= -1 \end{aligned}$$

$$\left[\begin{array}{ccc|c} 2 & -5 & 4 & -1 \\ -3 & 7 & -6 & 0 \\ -1 & 2 & -2 & -1 \end{array}\right] R_1 \leftrightarrow R_3 \longrightarrow \left[\begin{array}{ccc|c} -1 & 2 & -2 & -1 \\ -3 & 7 & -6 & 0 \\ 2 & -5 & 4 & -1 \end{array}\right] -R_1 \longrightarrow \left[\begin{array}{ccc|c} 1 & -2 & 2 & 1 \\ -3 & 7 & -6 & 0 \\ 2 & -5 & 4 & -1 \end{array}\right] \begin{array}{l} \\ +3R_1 \\ -2R_1 \end{array}$$

$$\longrightarrow \left[\begin{array}{ccc|c} 1 & -2 & 2 & 1 \\ 0 & 1 & 0 & 3 \\ 0 & -1 & 0 & -3 \end{array}\right] \begin{array}{l} \\ \\ +R_2 \end{array} \longrightarrow \left[\begin{array}{ccc|c} 1 & -2 & 2 & 1 \\ 0 & 1 & 0 & 3 \\ 0 & 0 & 0 & 0 \end{array}\right] \begin{array}{l} +2R_2 \\ \\ \\ \end{array} \longrightarrow \left[\begin{array}{ccc|c} 1 & 0 & 2 & 7 \\ 0 & 1 & 0 & 3 \\ 0 & 0 & 0 & 0 \end{array}\right]$$

$x+2z=7$

$y=3$

SOLUTION: $x=7-2z$, $y=3$, $z=z$

Using Gauss-Jordan elimination as shown in lecture, solve the following problem. **SCORE: _____ / 7 PTS**

You must produce a matrix in reduced row echelon form (RREF) as part of your solution.

Scale your original equations so all coefficients are integers before you write the matrix.

Midnight Coffee uses Brazilian, Vietnamese and Indonesian beans to create three custom blends. Dert Blend is one part Brazilian and two parts Vietnamese. Sut Blend is two parts Brazilian and one part Indonesian. Charqol Blend is equal parts Brazilian, Indonesian and Vietnamese. How many pounds of each blend must be combined to get a total of 9 pounds of Brazilian beans, 5 pounds of Vietnamese beans and 4 pounds of Indonesian beans ? **Check your answer. Summarize your final answer in a sentence using the correct units.**

d = # POUNDS DERT
s = SUT
c = CHARQOL

$$\begin{aligned} 9 &= \tfrac{1}{3}d+\tfrac{2}{3}s+\tfrac{1}{3}c \qquad & d+2s+c &= 27 \\ 5 &= \tfrac{2}{3}d \qquad\quad +\tfrac{1}{3}c & 2d \qquad +c &= 15 \\ 4 &= \qquad \tfrac{1}{3}s+\tfrac{1}{3}c & s+c &= 12 \end{aligned}$$

$$\left[\begin{array}{ccc|c} 1 & 2 & 1 & 27 \\ 2 & 0 & 1 & 15 \\ 0 & 1 & 1 & 12 \end{array}\right] \begin{array}{l} \\ +(-2)R_1 \\ \\ \end{array} \longrightarrow \left[\begin{array}{ccc|c} 1 & 2 & 1 & 27 \\ 0 & -4 & -1 & -39 \\ 0 & 1 & 1 & 12 \end{array}\right] R_2 \leftrightarrow R_3 \longrightarrow \left[\begin{array}{ccc|c} 1 & 2 & 1 & 27 \\ 0 & 1 & 1 & 12 \\ 0 & -4 & -1 & -39 \end{array}\right] \begin{array}{l} \\ \\ +4R_2 \end{array} \longrightarrow$$

$$\left[\begin{array}{ccc|c} 1 & 2 & 1 & 27 \\ 0 & 1 & 1 & 12 \\ 0 & 0 & 3 & 9 \end{array}\right] \begin{array}{l} \\ \\ \tfrac{1}{3}R_3 \end{array} \longrightarrow \left[\begin{array}{ccc|c} 1 & 2 & 1 & 27 \\ 0 & 1 & 1 & 12 \\ 0 & 0 & 1 & 3 \end{array}\right] \begin{array}{l} +(-1)R_3 \\ +(-1)R_3 \\ \\ \end{array} \longrightarrow \left[\begin{array}{ccc|c} 1 & 2 & 0 & 24 \\ 0 & 1 & 0 & 9 \\ 0 & 0 & 1 & 3 \end{array}\right] \begin{array}{l} +(-2)R_2 \\ \\ \\ \end{array} \longrightarrow \left[\begin{array}{ccc|c} 1 & 0 & 0 & 6 \\ 0 & 1 & 0 & 9 \\ 0 & 0 & 1 & 3 \end{array}\right]$$

6 POUNDS DERT, 9 POUNDS SUT, 3 POUNDS CHARQOL

✓ $\tfrac{1}{3}(6)+\tfrac{2}{3}(9)+\tfrac{1}{3}(3)=9$

$\tfrac{2}{3}(6)+\tfrac{1}{3}(3)=5$

$\tfrac{1}{3}(9)+\tfrac{1}{3}(3)=4$