

This trivial 50-minute four-page test covers chapter seven of College Algebra by Sullivan and Sullivan. Show your work and clearly indicate your answers. Unless otherwise indicated, each part of each problem is worth six points.

1. The length of fence required to enclose a rectangular field is 3000 meters. What are the dimensions of the field if it is known that the difference between the length and the width is 100 meters?

2. Solve the following systems of equations.

a.
$$\begin{vmatrix} 3 & 1 & 4 \\ 1 & x & 9 \\ 2 & 6 & x \end{vmatrix} = -90$$

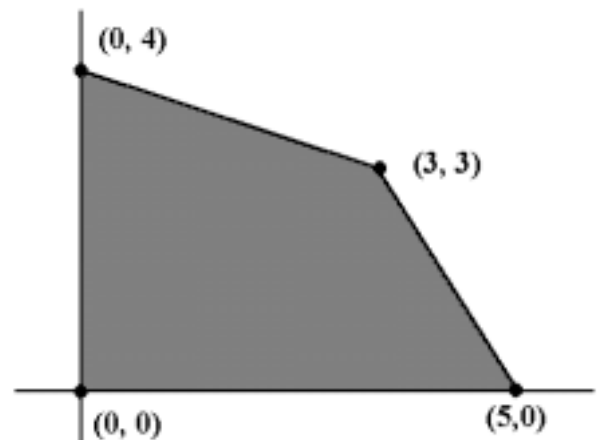
b.
$$\begin{cases} 2x - y = 3 \\ 4x - 2y = 6 \end{cases}$$

3. Find the minimum and maximum values of the given objective function, subject to the indicated constraints.

Objective function: $z = x + 5y$

min = _____ at (____, ____).

max = _____ at (____, ____).



4. Let $\mathbf{A} = \begin{bmatrix} 1 & 0 & 3 \\ 0 & 2 & 0 \end{bmatrix}$, $\mathbf{B} = \begin{bmatrix} 0 & -2 & 3 \\ 0 & 4 & 3 \end{bmatrix}$ and $\mathbf{C} = \begin{bmatrix} 0 & 2 \\ 4 & 0 \\ 2 & 3 \end{bmatrix}$. Find the following:

a. $13\mathbf{C}$

b. $3\mathbf{A} + 5\mathbf{B}$

c. \mathbf{AC}

5. Evaluate the following product: $\begin{pmatrix} 1 & 2 \\ 2 & x \end{pmatrix} \begin{pmatrix} 1 & 2 \\ 2 & x \end{pmatrix}$

6. Let $\mathbf{A} = \begin{pmatrix} 3 & 0 & 8 \\ 0 & 2 & 0 \\ 1 & 0 & 3 \end{pmatrix}$ Find the following.

a. $\det(\mathbf{A})$

b. \mathbf{A}^{-1}

7. Read these problems carefully, do only what is asked. (8 points each)

- a. JoJo's miniature Chuloc likes two kinds of pig slop. "Super Slop" costs \$23 a barrel and has 5700 calories per barrel. "Phat Cat" costs \$99 per barrel and provides 6465 calories. JoJo likes Chuloc to have at least 15000 calories during the week, but only has room for only 12 barrels. To minimize the cost of the food for Chuloc, how many cans of each kind should she buy? (**Just write the objective function and the constraints--do not solve!**)

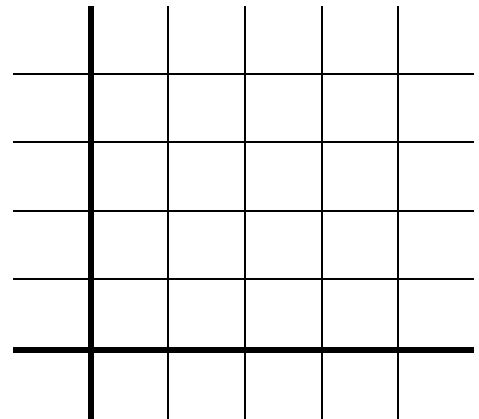
Objective function: $z =$

Constraints:

- b. **Sketch the region determined** by the given constraints. Label the intersection points. (**Do not maximize/minimize.**)

Objective function: $z = 3x + 2y$

$$\text{Constraints: } \begin{cases} x > 0 \\ y > 0 \\ x + 2y < 4 \\ 4x + 3y < 9 \end{cases}$$



8. Solve the following systems of equations using matrices (*row operations*). You must show the matrix you start with (even if you use your calculator), and the matrix you end with.

(8 points each)

a.
$$\begin{cases} x - y + 2z = 16 \\ 2x - 3y + z = -2 \\ 3x - 5y = -20 \end{cases}$$

b.
$$\begin{cases} x - y + z = 4 \\ 2x - z = 1 \\ -2y + 3z = 0 \end{cases}$$