

This test covers chapter seven of College Algebra by Sullivan and Sullivan. Show your work and clearly indicate your answers. Relax and read each question carefully. Unless otherwise indicated, each part of each problem is worth six points.

1. Solve the following systems of equations, use any method you wish (for example, you might wish to use your calculator on part a). If you give approximate answers, show the results correct to two decimal places.

a.
$$\begin{cases} x^4 + y = 19 \\ x^3 y = 24 \end{cases}$$

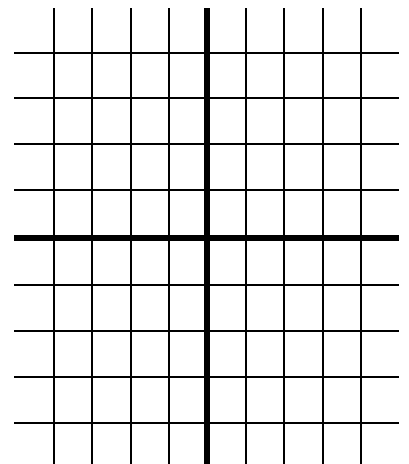
b.
$$\begin{cases} 3x^2 + 2y^2 = 11 \\ 8x^2 = 4y \end{cases}$$

c.
$$\begin{vmatrix} 3 & x & 4 \\ x & 0 & 2 \\ 5 & 0 & 5 \end{vmatrix} = -90$$

d.
$$\begin{cases} x + 2y = 3 \\ 3x + 6y = 9 \end{cases}$$

2. Sketch the graph of the solution set of the following system of inequalities, **label** the intersection points.

$$\begin{cases} x^2 + y^2 \leq 6 \\ x^2 \leq 3y \end{cases}$$



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

a. $3\mathbf{C}$

b. $\mathbf{A} - 2\mathbf{B}$

c. \mathbf{AC}

4. Let $\mathbf{A} = \begin{pmatrix} 3 & 4 & 8 \\ 0 & 4 & 4 \\ 2 & 0 & 6 \end{pmatrix}$ Find the following.

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

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

5. 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).

(7 points each)

a.
$$\begin{cases} x - y + 2z = 1 \\ 2x - 3y + z = 1 \\ 3x - 5y = 1 \end{cases}$$

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

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

a. Mary’s dog GiGi likes two kinds of canned cat food. “Super Cat” costs 33 cents a can and has 78 calories per can. “Phat Cat” costs \$1.63 per can and provides 815 calories. Mary likes GiGi to have at least 8350 calories during the week, but only has room for only 15 cans. To minimize the cost of the food for GiGi, how many cans of each kind should she buy? (**Just write the objective function and the constraints--do not solve!**)

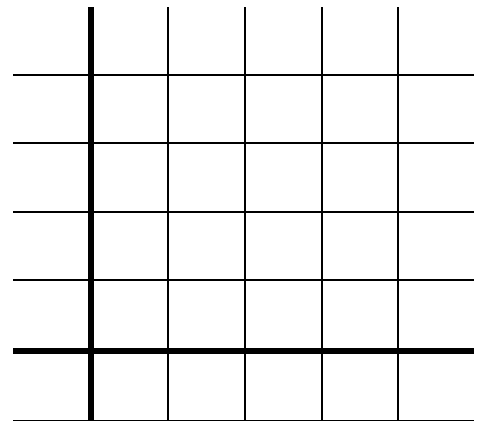
Objective function: $z =$

Constraints:

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

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

Constraints: $\begin{cases} x \geq 0 \\ y \geq 0 \\ 4x + 3y \leq 12 \\ 2x + 5y \leq 10 \end{cases}$



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

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

min = _____ at (____, ____).

max = _____ at (____, ____).

