

# College Algebra (Math1043)

Exam Iv-warmup(3 pages)

## Section 5.1 & 5.2:

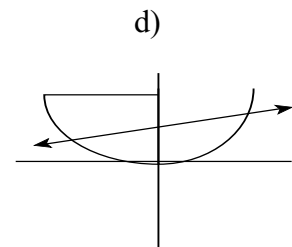
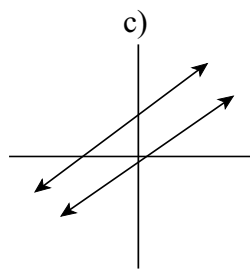
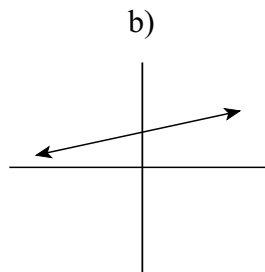
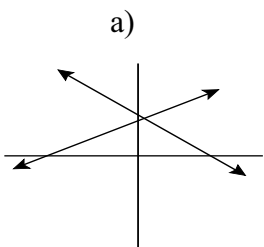
1. Know what a system of two linear equations in two unknowns is and be familiar with the general form of such equations.
2. Know what it means to say that a system of two linear equations is consistent and independent, inconsistent, and consistent and dependent. And know the graphical meaning of these.
3. Be able to solve a system of two linear equations by each one of the following methods:
  - a) Graphical
  - b) Substitution
  - c) Elimination by Addition
4. Be able to solve word problems using the idea of the systems of linear equations in two unknowns.

**Examples:** Look at all the homework problems assigned. Here are some more:

1. A college student earns \$178.20 each week from the 30 hours he works in two part-time jobs. On one of the jobs he works as a cook in a fast-food chain making \$5.70 per hour. His other job is at a gas station where he makes \$6.30 per hour. How many hours per week does the student work at each job?
2. A parking meter contains only nickels and dimes worth \$6.05. Suppose there are 89 coins in all. Find the number of dimes and nickels.
3. A bank coin contains only nickels and dimes. The value of the coins is \$1.30. If the nickels were dimes and the dimes were nickels, the value of the coins would be \$1.55. If  $x$  represents the original number of nickels and  $y$  represents the original number of dimes, then which of the following represents this problem?

1. Which of the following systems is

- i) An inconsistent system?
- ii) A consistent and independent system
- iii) A consistent and dependent system?
- iv) Not a linear system.



2. Solve each of the given systems by the three methods discussed above.

a) 
$$\begin{cases} 4x + 2y = 6 \\ 3x + 3y = 6 \end{cases}$$

b) 
$$\begin{cases} y = -2.3x - 5.7 \\ y = \sqrt{3}x + 41 \end{cases}$$

c) 
$$\begin{cases} x - 2y = 7 \\ 2x + 2y = -1 \end{cases}$$

### Section 5.3:

1. Be familiar with the systems of more than two linear equations in more than two unknowns.
2. Be familiar with the matrix of coefficients and the augmented matrix associated with a given system of linear equations.
3. Be able to write the matrix of coefficient and the augmented matrix if the system is given and conversely, be able to write the system if the augmented is given.
4. Be familiar with the lower triangular form of an augmented matrix and know why this form of augmented matrix is interesting. Be able to apply back substitution to a lower triangular augmented matrix to solve the associated system for the unknown involved.
5. Be familiar with the so called “Row Operations” and know what the purpose of these operations is.
6. Be able to use the row operations to transform an augmented to a lower triangular one. Therefore, be able to solve a system of linear equations in more than two unknowns by Gauss Elimination and Back Substitution method.
7. Know when a system of more than two unknown has one solution only, infinitely many solutions, or no solutions.

**Examples:** Look at all the assigned problems and the supplementary set of problems distributed in class.

### Section 5.4:

1. Know what a linear inequality in two variable look like.
2. Know what a test point for a linear inequality is.
2. Be able to find the solution region of a linear inequality by graphing the boarder line and using a test point to find the solution region associated with a linear inequality.
3. Be able to use the techniques discussed above to find the solution region of a system of more than one linear inequality.

**Examples:** Look at all the homework problems assigned from this section.

## Section 5.5:

1. Know the concept of linear programming.
2. Know what a feasible region and its corresponding objective function are.
3. Be able to use the techniques of section 5.4 to sketch a feasible region and be able to find the maximum and/or minimum value of the corresponding objective function over the its feasible region.
4. Be able to solve word problems involving linear programming.

**Examples:** Look at all the homework problems. Here are some more:

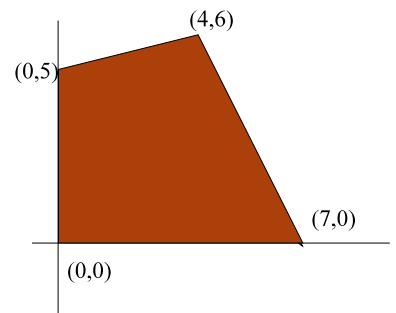
1. Find the solution region of each of the following systems:

$$\begin{array}{llll}
 \text{a) } \begin{cases} x < y \\ 2x - y \geq 4 \\ x \geq 0 \end{cases} & 
 \text{b) } \begin{cases} y \leq x \\ x + y \leq 4 \\ y \geq 0 \end{cases} & 
 \text{c) } \begin{cases} y \leq 2x \\ x + 2y \leq 4 \\ y \geq 0 \end{cases} & 
 \text{d) } \begin{cases} x + 2y \geq -1 \\ x - y \leq 1 \end{cases} \quad \text{d)}
 \end{array}$$

2. Find the minimize and the maximum of the objective function  $F = 9x - 2y + 10$  over the region below:

3. Find all the constraints (boundaries) for this region

4. A farmer is getting ready to plant a new crop of Christmas trees. She has room to plant no more than 600 trees in all and wants to plant some of each of the two variety of trees she sells, standard and special deluxe trees. Due to costumer demands, she knows she must plant at least twice as many standard as deluxe trees. Standard trees sale for \$25 and deluxe for \$32. She wishes to determine how many of each type to plant in order to maximize her revenue. Let  $x$  represent the number of standard type and  $y$  represent the number of special deluxe.



- a) List the constraints that must be used in order to solve this problem.

- b) Find the objective function.

- c) Sketch the region associated with this problem.

- d) How many trees of each kind should the farmer plant in order to maximize his revenue?

- 5.

$$\begin{cases} x \geq 0 \\ y \geq 0 \\ 2x + y \leq 10 \\ 2x + 4y \leq 28 \end{cases} \quad P = 140 - x + 3y \quad \text{Sketch the feasible region and maximize } P(x, y).$$

$$\begin{cases} 0 \leq x \leq 10 \\ 0 \leq y \leq 20 \\ x + y \geq 5 \\ x + 2y \leq 18 \end{cases} \quad Q = 70x + 82y \quad \text{Sketch the feasible region and minimize } Q(x, y).$$