

## PRECALCULUS PROBLEM SESSION #14

### Systems of Linear Equations in Two Variables

1. How many solutions can a system of two linear equations in two variables have? Give geometric interpretations of each case.

2. Determine whether either of the points  $(-1, -5)$  and  $(0, -2)$  is a solution to the given system of equations:

$$y = 3x - 2$$

$$y = -x - 6$$

3. Solve by using the substitution method:

$$\text{a. } \begin{cases} 2x - 3y = -13 \\ y = 2x + 7 \end{cases}$$

$$\text{b. } \begin{cases} x = 3y + 7 \\ x = 2y - 1 \end{cases}$$

4. Solve by using the addition method:

$$\text{a. } \begin{cases} 2x - 7y = 2 \\ 3x + y = -20 \end{cases}$$

$$\text{b. } \begin{cases} 2x + 3y = -16 \\ 5x - 10y = 30 \end{cases}$$

5. Solve by using any method. Identify systems with no solutions and systems with infinitely many solutions using set notation to express the solution set.

$$\text{a. } \begin{cases} 6x + 2y = 7 \\ y = 2 - 3x \end{cases}$$

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

$$\text{c. } \begin{cases} 4x = 3y + 8 \\ 2x = -14 + 5y \end{cases}$$

### Systems of Nonlinear Equations in Two Variables

1. Solve the system:

$$\text{a. } \begin{cases} y = -x - 3 \\ x^2 + y^2 = 17 \end{cases}$$

$$\text{b. } \begin{cases} xy = 1 \\ x + y = 2 \end{cases}$$

$$\text{c. } \begin{cases} y = x^2 \\ x^2 + (y - 2)^2 = 4 \end{cases}$$

2. Solve by using the substitution method:

$$\text{a. } \begin{cases} x - y = -1 \\ y = x^2 + 1 \end{cases}$$

$$\text{b. } \begin{cases} x^2 + y^2 = 5 \\ 3x - y = 5 \end{cases}$$

$$\text{c. } \begin{cases} xy = 4 \\ x^2 + y^2 = 8 \end{cases}$$

3. Solve by using the addition method:

$$\begin{cases} 3x^2 - 2y^2 = -5 \\ 2x^2 - y^2 = -2 \end{cases}$$

4. Solve by using any method:

$$\text{a. } \begin{cases} 3x^2 - 2y^2 = 1 \\ 4x - y = 3 \end{cases}$$

$$\text{b. } \begin{cases} x - 3y = -5 \\ x^2 + y^2 - 25 = 0 \end{cases}$$

$$\text{c. } \begin{cases} 3x^2 + 2y^2 = 35 \\ 4x^2 - 3y^2 = 24 \end{cases}$$