7.5 REVIEW OF SYSTEMS OF LINEAR EQUATIONS IN TWO VARIABLES
System of equations – a set of equations in two or more variables (x & y) used to solve one problem
- One variable needs 1 equation \( x = \)
- Two variables need two equations \((x,y)\)
- Three variables needs 3 equations \((x,y,z)\)

The solution is the point of intersection between the equations of the lines.
Examples

1. Is \((3, 2)\) a solution for \(2x + 3y = 12\) \(x - 4y = -5\)

2. Is \((-3, 4)\) a solution for \(2x = -y - 2\) \(y = -4\)
Types of Solutions

- One solution - intersection point
- No solution - parallel lines
- Infinitely many solutions - same line
Elimination Method

- Used when coefficients are not 1 or -1 and when coefficients involve decimals and fractions
- Uses the addition principle to “eliminate” one variable
- Preferred method for systems in 3 variables

Steps:
1. Look to determine which variable is “easiest” to make into opposites so you can eliminate it
2. Add two equations to eliminate variable
3. Solve for remaining variable
4. Substitute this value to find unknown
Examples

1. \( x - y = -1 \)
   \[ 5x - 2y = 10 \]

2. \( 4x + 5y = -3 \)
   \[-8x - 10y = 3 \]

3. \( 3x - 2y = 1 \)
   \[-6x + 4y = -2 \]
Substitution

- Often used when one or more coefficients are 1 or -1 or one equations has a variable alone on one side

Steps
1. Solve one equation for one variable, if necessary
2. Substitute this value into 2nd equation
3. Solve for remaining variable
4. Substitute resulting solutions into any equations to find remaining unknown.
Examples

1. \[9 - 2y = 3\]
   \[3x - 6 = y\]

2. \[2x - 3 = y\]
   \[y - 2x = 1\]

3. \[\frac{2}{5}x - \frac{2}{3}y = 0\]
   \[y = \frac{3}{5}x\]