

Review of 5.1 - 5.3 Linear Systems

Linear System: a set/group of 2 or more linear equations

~ a solution to a linear system is an ordered pair (x, y)

Methods of Solving Linear Systems:

1. Graphing
2. Substitution
3. Elimination

After you find a possible solution, you must ALWAYS check it in the original equations.

Example of Method 1 Graphing:

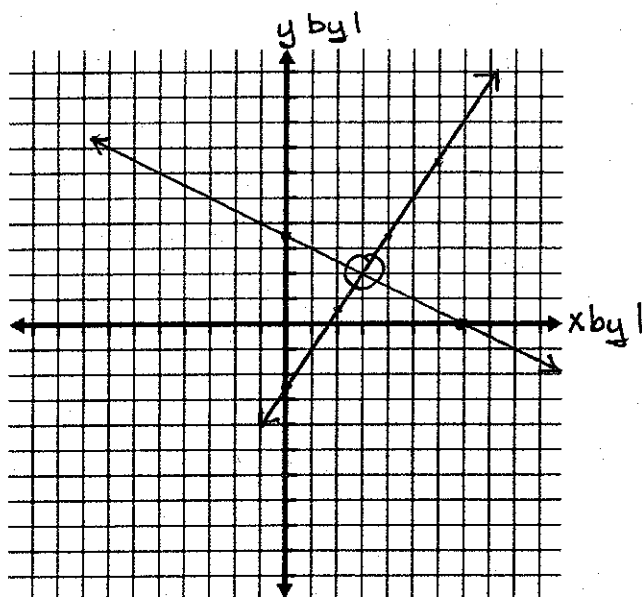
$$\begin{array}{l} x + 2y = 7 \\ 3x - 2y = 5 \end{array}$$

$$\begin{array}{r} 3x - 2y = 5 \\ -3x \quad -3x \\ \hline -2y = -3x + 5 \\ \frac{-2y}{-2} = \frac{-3x + 5}{-2} \\ y = \frac{3}{2}x - \frac{5}{2} \end{array}$$

$$\begin{array}{l} \text{x-int let } y = 0 \\ x + 2(0) = 7 \\ x = 7 \quad (7, 0) \\ \text{y-int. let } x = 0 \\ 2y = 7 \\ y = \frac{7}{2} = 3.5 \\ (0, 3.5) \end{array}$$

$$\begin{array}{l} 3 + 2(2) = 7 \\ 3 + 4 = 7 \\ 7 = 7 \checkmark \end{array}$$

$$\begin{array}{l} 3(3) - 2(2) = 5 \\ 9 - 4 = 5 \\ 5 = 5 \checkmark \end{array}$$



Example of Method 2 Substitution:

$$\begin{array}{l} x - 2y = -6 \\ 4x + 6y = 4 \end{array}$$

$$\begin{array}{l} 4(2y - 6) + 6y = 4 \\ 8y - 24 + 6y = 4 \\ 14y - 24 = 4 \\ \frac{14y}{14} = \frac{28}{14} \\ y = 2 \end{array}$$

↳ look for a coefficient of 1/-1.

$$\begin{array}{l} x - 2y = -6 \\ +2y \quad +2y \\ \hline x = 2y - 6 \\ x = 2(2) - 6 \\ x = 4 - 6 \\ x = -2 \end{array}$$

$$(-2, 2)$$

Check: ?

$$\begin{array}{l} -2 - 2(2) = -6 \\ -2 - 4 = -6 \\ -6 = -6 \checkmark \\ 4(-2) + 6(2) = 4 \\ -8 + 12 = 4 \\ 4 = 4 \checkmark \end{array}$$

Example of Method 3

Elimination

$$\begin{array}{r} 2x + 3y = 11 \\ + -2x + 5y = 13 \\ \hline \end{array}$$

$$0 + \frac{8y}{8} = \frac{24}{8}$$

$$y = 3$$

↳ look for opposite coefficients

$$\begin{array}{r} 2x + 3(3) = 11 \\ 2x + 9 = 11 \\ -9 \quad -9 \end{array}$$

$$\frac{2x}{2} = \frac{2}{2}$$

$$x = 1$$

$$(1, 3)$$

Check:

$$2(1) + 3(3) \stackrel{?}{=} 11$$

$$2 + 9 = 11$$

$$11 = 11 \checkmark$$

$$-2(1) + 5(3) \stackrel{?}{=} 13$$

$$-2 + 15 = 13$$

$$13 = 13 \checkmark$$

Example 4: $4x + 5y = 35$

$$\begin{array}{r} 2y = 3x - 9 \\ -3x - 3x \end{array}$$

$$\begin{array}{r} (4x + 5y = 35) \cdot 3 \\ (-3x + 2y = -9) \cdot 4 \end{array}$$

$$4x + 5(3) = 35$$

$$\begin{array}{r} 4x + 15 = 35 \\ -15 \quad -15 \end{array}$$

$$\frac{4x}{4} = \frac{20}{4}$$

$$x = 5$$

$$(5, 3)$$

Check:

$$4(5) + 5(3) \stackrel{?}{=} 35$$

$$20 + 15 = 35$$

$$35 = 35 \checkmark$$

$$\begin{array}{r} + 12x + 15y = 105 \\ -12x + 8y = -36 \\ \hline \end{array}$$

$$\frac{23y}{23} = \frac{69}{23}$$

$$y = 3$$

$$2(3) \stackrel{?}{=} 3(5) - 9$$

$$6 \stackrel{?}{=} 15 - 9$$

$$6 = 6 \checkmark$$

Checkpoints: Solve the following linear systems using the method of your choice. Don't forget to check your answer!

1. $3x + 2y = 4$
 $2y = 8 - 5x$

2. $3x - 2y = -20$
 $x + 1.2y = 6.4$