Linear Systems: SUBSTITUTION METHOD

Guided Notes

Steps for solving systems using SUBSTITUTION:

- ⦿ Step 1: Isolate one of the variables.
- ⦿ Step 2: Substitute the expression from Step 1 into the OTHER equation.
  - The resulting equation should have only one variable, not both *x* and *y*.
- ⦿ Step 3: Solve the new equation.
  - This will give you one of the coordinates.
- ⦿ Step 4: Substitute the result from Step 3 into either of the original equations.
- ⦿ Step 5: Solve for the other coordinate.
- ⦿ Step 6: Write the solution as an ordered pair. (*x*, *y*)

Example:

a) $y = 2x - 1$

b) $3x + 2y = 26$

⦿ Step 1: Isolate one of the variables.

⦿ Step 2: Substitute the expression from Step 1 into the OTHER equation.
- The resulting equation should have only one variable, not both *x* and *y*.

⦿ Step 3: Solve the new equation.
- This will give you one of the coordinates.

⦿ Step 4: Substitute the result from Step 3 into either of the original equations.

⦿ Step 5: Solve for the other coordinate.

⦿ Step 6: Write the solution as an ordered pair. (*x*, *y*)

⦿ Step 1: Equation **a** already has y isolated.

⦿ Step 2: 3x + 2y = 26
3x + 2(**2x – 1**) = 26

⦿ Step 3: 3x + 4x – 2 = 26
7x – 2 = 26
+2 + 2
7x = 28
7 7
x = 4

⦿ Step 4: y = 2 (**4**) – 1

⦿ Step 5: **y = 7**

⦿ Step 6: **(4, 7)**

Example: a) $-4x + y = 6$
b) $-5x - y = 21$

- Step 1: Isolate one of the variables.
- Step 2: Substitute the expression from Step 1 into the OTHER equation.
  - The resulting equation should have only one variable, not both *x* and *y*.
- Step 3: Solve the new equation.
  - This will give you one of the coordinates.
- Step 4: Substitute the result from Step 3 into either of the original equations.
- Step 5: Solve for the other coordinate.
- Step 6: Write the solution as an ordered pair. (*x*, *y*)

- Step 1: Isolate Equation **a** because y has a coefficient of positive 1.

$$-4x + y = 6$$
$$+4x \qquad +4x$$
$$y = 6 + 4x$$

- Step 2: $-5x - y = 21$
  $-5x - (\mathbf{6 + 4x}) = 21$
- Step 3: $-5x - 6 - 4x = 21$
  $-9x - 6 = 21$
  $+6 \quad +6$
  $-9x = 27$
  $-9 \quad -9$
  $\mathbf{x = -3}$
- Step 4: $y = 6 + 4$ (**–3**)
- Step 5: **y = -6**
- Step 6: **(-3, -6)**