

3.2a Solving Linear Systems Algebraically

Substitution (replacing ^{the} ~~the~~ circle of life)

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

Write side by side & solve one eqn for x or y

① $2x + 5y = -5$

② $x + 3y = 3$
 $x = 3 - 3y$

1st - Solve ② for x... easier

$$2(3 - 3y) + 5y = -5$$

$$6 - 6y + 5y = -5$$

$$6 - 1y = -5$$

$$-1y = -11$$

$$y = 11$$

2nd - Plug in $3 - 3y$ for x in the ① eqn

$$x = 3 - 3(11)$$

$$x = 3 - 33$$

$$x = -30$$

3rd - Plug in $y = 11$ into eqn #2 (complete the circle)

Solution $(-30, 11)$

Example - Solve for x, y

$$2x + 5y = 7$$

$$x + 4y = 2$$

$$2x + 5y = 7$$

$$x + 4y = 2$$

$$x = 2 - 4y$$

$$2(2 - 4y) + 5y = 7$$

$$4 - 8y + 5y = 7$$

$$4 - 3y = 7$$

$$-3y = 3$$

$$y = -1$$

$$x = 2 - 4(-1)$$

$$x = 2 + 4$$

$$x = 6$$

$$(6, -1)$$

$$3x + y = 16$$

$$2x - 3y = -4$$

$$3x + y = 16$$

$$y = 16 - 3x$$

$$2x - 3y = -4$$

$$2x - 3(16 - 3x) = -4$$

$$2x - 48 + 9x = -4$$

$$11x - 48 = -4$$

$$11x = 44$$

$$x = 4$$

$$y = 16 - 3(4)$$

$$y = 16 - 12$$

$$y = 4$$

$$(4, 4)$$

P164: 13 odd, 10 5 & 10 are special