

TB 3-2 Solving Systems by Substitution

I. No graphing needed

A) just plug'n'chug

$$\text{ex/ } \begin{cases} y = 3x + 1 \\ -2x + y = 3 \end{cases}$$

plug in $3x+1$ for y
into)

$$-2x + (3x + 1) = 3$$

$$x + 1 = 3$$

$$x = 2$$

now plug in x !

(whichever equation you want)

$$y = 3x + 1$$

$$y = 3(2) + 1 = 6 + 1$$

$$y = 7$$

$$x = 2 \quad y = 7$$

(2, 7) is the solution

consistent independent one solution

$$\text{ex/ } \begin{cases} y - 3 = (x - 3) \\ y = x \end{cases}$$

plug in y to replace x
in 1st equation

$$y - 3 = (y - 3)$$

$$y = y$$

always true!

...dependent, consistent

infinitely many solutions

II. When its not given to you...

A) If no variable is alone

→ start by picking a variable in an equation to isolate (get it alone)

$$\text{ex/ } \begin{cases} 2y+4 = 3x \\ 5x+y = 11 \end{cases}$$

easiest: get y alone
in 2nd equation

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

$$y = -5x + 11 \leftarrow \text{plug this in another equation}$$

$$\textcircled{1^{\text{st}}} \quad 2y+4 = 3x \quad y = -5x+11$$

$$2(-5x+11) + 4 = 3x$$

$$-10x + 22 + 4 = 3x$$

$$-10x + 26 = 3x$$

$$26 = 13x$$

$$2 = x$$

$$y = -5(2) + 11 \quad (2, 1)$$

$$y = -10 + 11$$

$$y = 1$$

choose y in
2nd

$$\text{ex/ } \begin{cases} 2y-7 = 6x \\ 3y+9 = 9x \end{cases}$$

$$3y+9 = 9x$$

$$\frac{3y}{3} = \frac{9x-9}{3}$$

$$y = 3x - 3$$

$$2(3x-3) - 7 = 6x$$

$$6x - 6 - 7 = 6x$$

$$\begin{array}{r} 6x - 13 = 6x \\ -6x = -6x \\ \hline -13 = 0 \end{array}$$

$$-13 = 0$$

inconsistent

No solution