

Note: IB calls it

Simultaneous equations

System of equations: graphing + substitution + elimination

Page 156: 2-16 (only even) **Done. Due TODAY**

Page 164: 4-~~26~~ (only even) **Due next class!**
4-14 (only even) **Tuesday, Nov. 6**

Overview

- 1 variable → 1 equation

$$2x + 10 = 5$$

- 2 variables → 2 equations

$$\begin{cases} 2x + y = 10 \\ x + y = 20 \end{cases}$$

Steps to solving a system by substitution

Isolate a variable

Substitute it into the second equation

Solve for the ONE variable

Solve for the SECOND variable

• Now solve step by step:

$$\begin{cases} 8x+2y=19 \\ x=3 \end{cases} \Rightarrow 8(3)+2y=19$$
$$24+2y=19$$
$$2y=19-24$$
$$2y=-5$$
$$y=-\frac{5}{2} \text{ or } -2.5$$
$$x=3$$

Another example

Isolate a variable

Substitute it into the second equation

Solve for the ONE variable

Solve for the SECOND variable

• Step by step:

$$\begin{cases} 15x-5y=30 \\ y=2x+3 \end{cases} \Rightarrow 15x-5(2x+3)=30$$
$$15x-10x-15=30$$
$$5x-15=30$$
$$\begin{array}{r} +15 \\ +15 \end{array}$$
$$5x=30+15$$
$$5x=45$$
$$x=9$$
$$y=2(9)+3$$
$$y=18+3$$
$$y=21$$

Another one

Isolate a variable

Substitute it into the second equation

Solve for the ONE variable

Solve for the SECOND variable

$$\begin{cases} 3x + y = 4 \\ 5x - 7y = 11 \end{cases} \Rightarrow y = 4 - 3x$$

$$5x - 7(4 - 3x) = 11$$

$$5x - 28 + 21x = 11$$

$$26x - 28 = 11$$

$$26x = 11 + 28$$

$$26x = 39$$

$$x = 39/26 = 1.5$$

$$\begin{aligned} y &= 4 - 3x \\ y &= 4 - 3(1.5) \\ y &= 4 - 4.5 \\ y &= -0.5 \end{aligned}$$

The "y"-method

Put the "y's" together

Solve for variable ONE

Solve for SECOND variable

$$\begin{cases} y = 5 - 3x \\ y = 2x - 10 \end{cases}$$

$$5 - 3x = 2x - 10$$

$$-3x - 2x = -10 - 5$$

$$y = 2x - 10 \quad -5x = -15$$

$$x = \frac{-15}{-5}$$

$$y = 2(3) - 10$$

$$y = 6 - 10$$

$$y = -4$$

$$x = 3$$

Some books like to give the solution as a point, with its coordinates (x,y)

$$\therefore (3, -4)$$