8-10 (Day 3): Solving Systems of Equations by Elimination

1-29-16

IMPORTANT: Both equations MUST be in standard form $Ax+By=C$

Steps:

1. Manipulate one (or both) equations to make a variable opposite $2x, -2x$
2. Add the two equations together
3. Solve for the remaining variable
4. Use either original equation to solve for the eliminated variable

Ex.1: Solve by elimination.

A)
$$\begin{aligned} 4x+5y&=6 \\ 3x-5y&=8 \\ \hline 7x&=14 \\ \frac{7x}{7}&=\frac{14}{7} \\ x&=2 \end{aligned}$$

* y terms are opposite & will be eliminated when we add equations

$$\begin{aligned} 4(2)+5y&=6 \\ 8+5y&=6 \\ -8 \quad & \quad -8 \\ \hline 5y&=-2 \\ \frac{5y}{5}&=\frac{-2}{5} \\ y&=-\frac{2}{5} \end{aligned}$$

$\boxed{(2,-\frac{2}{5})}$

B)
$$\begin{aligned} x+2y&=8 \\ x-3y&=13 \end{aligned}$$

* multiply one equation by -1 so x terms will be opposite

$$\begin{aligned} -1(x+2y&=8) \\ -x-2y&=-8 \\ x-3y&=13 \\ \hline -5y&=5 \\ \frac{-5y}{-5}&=\frac{5}{-5} \\ y&=-1 \end{aligned}$$

$$\begin{aligned} x+2(-1)&=8 \\ x-2&=8 \\ +2 \quad & \quad +2 \\ \hline x&=10 \end{aligned}$$

$\boxed{(10,-1)}$

C)
$$\begin{aligned} 3x-3y&=-3 \\ 2x+y&=-5 \end{aligned}$$

* multiply by 3

$$\begin{aligned} 3(2x+y&=-5) \\ 6x+3y&=-15 \\ 3x-3y&=-3 \\ \hline 9x&=-18 \\ \frac{9x}{9}&=\frac{-18}{9} \\ x&=-2 \end{aligned}$$

$$\begin{aligned} 2(-2)+y&=-5 \\ -4+y&=-5 \\ +4 \quad & \quad +4 \\ \hline y&=-1 \end{aligned}$$

$\boxed{(-2,-1)}$

D)
$$\begin{aligned} 3x-4y&=10 \\ 5x+7y&=3 \end{aligned}$$

* sometimes we need to multiply both equations by different values

$$\begin{aligned} 5(3x-4y&=10) \\ -3(5x+7y&=3) \\ 15x-20y&=50 \\ -15x-21y&=-9 \\ \hline -41y&=41 \\ \frac{-41y}{-41}&=\frac{41}{-41} \\ y&=-1 \end{aligned}$$

$$\begin{aligned} 3x-4(-1)&=10 \\ 3x+4&=10 \\ -4 \quad & \quad -4 \\ \hline 3x&=6 \\ \frac{3x}{3}&=\frac{6}{3} \\ x&=2 \end{aligned}$$

$\boxed{(2,-1)}$

HW: 8-3, 8-4 Worksheet