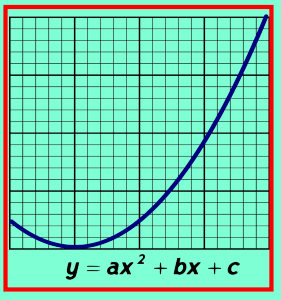
Math 125

Fall 2021

Lecture 19



Class QZ 14

Solve $|2x-1|-3 \leq 6$

$|2x-1| \leq 9$

$|2x-1| = 9$

$2x-1 = 9$ $\quad$ $2x-1 = -9$

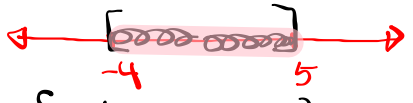
$2x = 10$ $\quad$ $2x = -8$

$x = 5$ $\quad$ $x = -4$

Express Ans in S.B.N., I.N., and graphing.

Work must be Similar to our lecture.

Portrait style only.



S.B.N. $\{x \mid -4 \leq x \leq 5\}$

I.N. $[-4, 5]$

System of linear equations in two Variables

$\begin{cases} x+y=6 \checkmark \\ x-y=2 \checkmark\checkmark \end{cases}$

Solution → ordered-Pair (,)

Solution must work for both equations.

Solution (4,2)

$4+2=6$

$4-2=2$

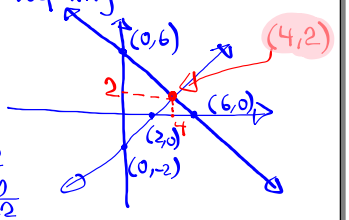
1) Graphing method

$x+y=6$

x	y
0	6
6	0

$x-y=2$

x	y
0	-2
2	0



2) Substitution method

$\begin{cases} x+y=6 \\ x-y=2 \end{cases} \rightarrow x=2+y$

$2+y+y=6$

$2+2y=6$

$2y=6-2$ $\quad 2y=4$ $\quad \boxed{y=2}$

$x=2+2$ $\quad \boxed{x=4}$

$(4,2)$

3) Addition Method

$\begin{cases} x+y=6 \\ x-y=2 \end{cases}$

$2x=8$ $\quad \boxed{x=4}$

$4+y=6$ $\quad \boxed{y=2}$

$(4,2)$

Solve

$\begin{cases} 2x+3y=6 \checkmark \\ x-y=3 \checkmark\checkmark \end{cases}$

Is $(3,0)$ a Solution? Yes

$x=3$ $\quad y=0$

$2(3)+3(0)=6$

$6+0=6$

$6=6$

$3-0=3$

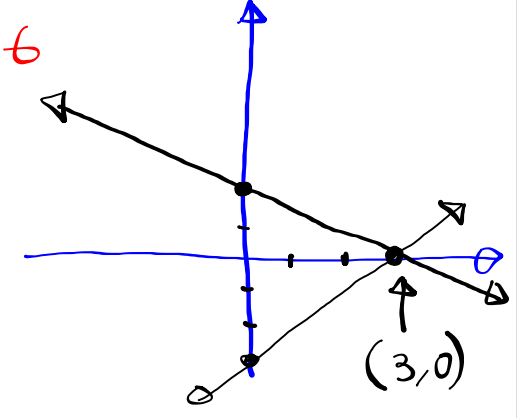
$3=3$

$2x+3y=6$

x	y
0	2
3	0

$x-y=3$

x	y
0	-3
3	0



$$\begin{cases} 2x + 3y = 6 \\ x - y = 3 \rightarrow x = 3 + y \end{cases}$$

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

$6 + 2y + 3y = 6$

$6 + 5y = 6$

$5y = 0$

$y = 0$

$x = 3 + 0$

$x = 3$

$(3, 0)$

$$\begin{cases} 2x + 3y = 6 \\ 3(x - y = 3) \end{cases} \Rightarrow \begin{cases} 2x + 3y = 6 \\ 3x - 3y = 9 \end{cases}$$

$5x = 15$

$x = 3$

$3 - y = 3$

$-y = 3 - 3$

$-y = 0$

$y = 0$

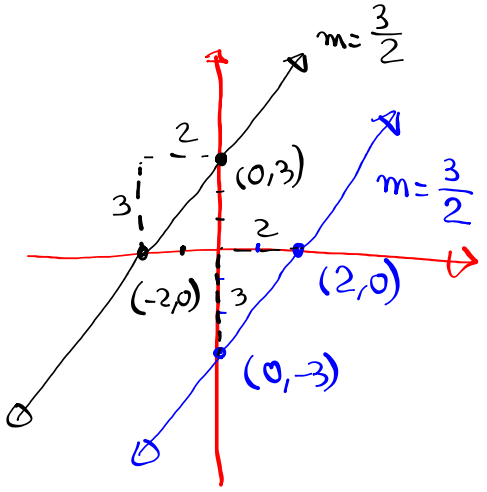
$\Rightarrow (3, 0)$

Solve by Graphing

$$\begin{cases} 3x - 2y = 6 \\ 3x - 2y = -6 \end{cases}$$

x	y
0	-3
2	0

x	y
0	3
-2	0



Parallel lines $\Leftrightarrow$ Same slope & Different Y-Int.

Don't cross each other

$\Rightarrow$ No Solution $\emptyset$

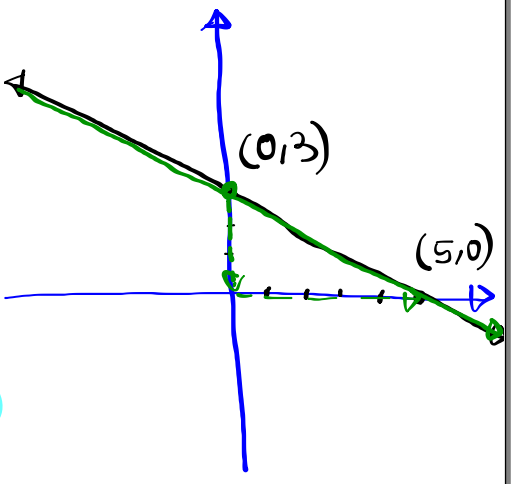
Solve by Graphing:

$$\begin{cases} 3x + 5y = 15 \\ y = \frac{-3}{5}x + 3 \end{cases}$$

x	y
0	3
5	0

Y-Int $(0,3)$

Slope $m = \frac{-3}{5}$



These two lines are the Same line

infinite number of points in Common

$\Rightarrow$ Infinite # of Solutions

Solve by Subs. method

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

$\Rightarrow 2x + 10 - 2x = 5$

$10 = 5$ False

NO Solution.

Solve by Subs. method

$$\begin{cases} 5x - 2y = 4 \\ y = \frac{5}{2}x - 2 \end{cases}$$

$5x - 2\left(\frac{5}{2}x - 2\right) = 4$

$5x - 2 \cdot \frac{5}{2}x - 2(-2) = 4$

$5x - 5x + 4 = 4$

$4 = 4$ True

Infinite number of Solutions

Solve by Addition method

$$2\begin{cases} x - 3y = 5 \\ -2x + 6y = 10 \end{cases} \Rightarrow \begin{cases} 2x - 6y = 10 \\ -2x + 6y = 10 \end{cases}$$

False $0 = 20$

No Solution

Solve by Addition Method

$$2\begin{cases} 3x - 4y = -5 \\ -6x + 8y = 10 \end{cases} \Rightarrow \begin{cases} 6x - 8y = -10 \\ -6x + 8y = 10 \end{cases}$$

True $0 = 0$

Infinite # of Solutions

Solve

$$-2|3x-1|+5=-7$$

$$-2|3x-1| = -12$$

$$|3x-1| = 6$$

Now $3x-1=6$ OR $3x-1=-6$

$3x=7$ $3x=-5$

$x=\frac{7}{3}$ $x=\frac{-5}{3}$

$\left\{\frac{-5}{3}, \frac{7}{3}\right\}$

Solve

$|3x+5|-|x-4|=0$

$|3x+5|=|x-4|$

$3x+5=x-4$ OR $3x+5=-(x-4)$

$3x-x=-4-5$ $3x+5=-x+4$

$2x=-9$ $3x+x=4-5$

$x=-9/2$ $4x=-1$

$x=\frac{-1}{4}$

$\left\{\frac{-9}{2}, \frac{-1}{4}\right\}$

Solve

$-3|2x-5|+1<-8$

$-3|2x-5|<-9$

$|2x-5|>\frac{-9}{-3}$

$|2x-5|>3$

Shade outside

Solve $|2x-5|=3$

$2x-5=3$ OR $2x-5=-3$

$2x=8$ $2x=2$

$x=4$ $x=1$

S.B.N. $\{x \mid x<1 \text{ OR } x>4\}$

I.N. $(-\infty, 1) \cup (4, \infty)$

Simplify $\dfrac{x^2-8x+12}{x^2-36} = \dfrac{\cancel{(x-6)}(x-2)}{(x+6)\cancel{(x-6)}}$

$= \boxed{\dfrac{x-2}{x+6}}$

Simplify:

$$\frac{x^2+8x+15}{x^2-9} \div \frac{x^2-25}{x^2-8x+15}$$

$$= \frac{x^2+8x+15}{x^2-9} \cdot \frac{x^2-8x+15}{x^2-25}$$

$$= \frac{\cancel{(x+3)}\cancel{(x+5)}}{\cancel{(x+3)}\cancel{(x-3)}} \cdot \frac{\cancel{(x-3)}(x-5)}{\cancel{(x+5)}(x-5)} = \frac{x-5}{x-5} = \boxed{1}$$

Simplify

$$\frac{2}{x^2-5x+6} - \frac{1}{x^2-4}$$

$$= \frac{2(x+2)}{(x-2)(x-3)(x+2)} - \frac{1(x-3)}{(x+2)(x-2)(x-3)}$$

$$= \frac{2(x+2)-1(x-3)}{(x-2)(x-3)(x+2)} = \boxed{\frac{x+7}{(x-2)(x-3)(x+2)}}$$

Solve $\frac{2}{x+5} - \frac{1}{x-3} = \frac{-7}{x^2+2x-15}$

Hint: Multiply everything by the LCD to clear all fractions.

$$\frac{2}{x+5} - \frac{1}{x-3} = \frac{-7}{(x+5)(x-3)}$$

LCD: $(x+5)(x-3)$ $\quad x+5\neq 0 \quad x-3\neq 0$

$x=-5 \quad x\neq 3$

Excluded Values

$$(x+5)(x-3)\cdot\frac{2}{x+5} - (x+5)(x-3)\cdot\frac{1}{x-3} = (x+5)(x-3)\cdot\frac{-7}{(x+5)(x-3)}$$

$2(x-3) - 1(x+5) = -7$

$2x-6-x-5=-7$

$x-11=-7$

$x=-7+11$

$x=4$

$\{4\}$

Solve $\frac{2}{x+5} - \frac{1}{x-3} = \frac{-8}{x^2+2x-15}$

Hint: Multiply everything by the LCD to clear all fractions.

$$\frac{2}{x+5} - \frac{1}{x-3} = \frac{-8}{(x+5)(x-3)}$$

LCD: $(x+5)(x-3)$ $\quad x+5\neq 0 \quad x-3\neq 0$

$x=-5 \quad x\neq 3$

Excluded Values

$$(x+5)(x-3)\cdot\frac{2}{x+5} - (x+5)(x-3)\cdot\frac{1}{x-3} = (x+5)(x-3)\cdot\frac{-8}{(x+5)(x-3)}$$

$2(x-3) - 1(x+5) = -8$

$2x-6-x-5=-8$

$x-11=-8$

$x=-8+11$

$x=3$

but $x\neq 3$ it was E.V.

$\emptyset$

Class QZ 15

Solve $|2x-7|-3>4$

Final Ans in graphing, SBN, and I.N.

Methods used must be Similar to class notes.

$|2x-7|>7$

$|2x-7|=7$

$2x-7=7$ $\quad$ $2x-7=-7$

$\boxed{x=7}$ $\quad$ $\boxed{x=0}$

SBN $\{x \mid x<0 \text{ or } x>7\}$

I.N. $(-\infty, 0) \cup (7, \infty)$