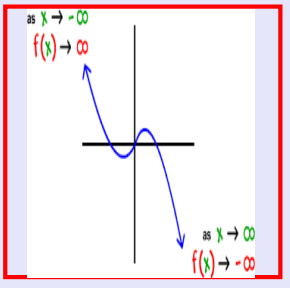
Math 245

Spring 2022

Lecture 7



Solve

1) $|3x-2|+8=2$

Always isolate the abs. value.

$|3x-2| = 2-8 \Rightarrow |3x-2| = -6$

$\emptyset$

2) $-2|2x+3|+7=-3$

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

$-2|2x+3| = -10$

$|2x+3| = \frac{-10}{-2}$

$\Rightarrow |2x+3| = 5$

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

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

$\boxed{x=1}$ $\quad$ $\boxed{x=-4}$

Solution set $\{-4, 1\}$

3) $|4x+2| = |3x+5|$

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

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

$\boxed{x=3}$ $4x+3x = -5-2$

$7x = -7$

$\boxed{x=-1}$

$\{-1, 3\}$

Solving abs. value inequalities:

$|ax+b| < K$ $|ax+b| \leq K$

$|ax+b| > K$ $|ax+b| \geq K$

$\Rightarrow$ Assume $K > 0$

1) Solve $|ax+b| = K$

2) Place solutions on the number line system

3) For $<$ or $\leq$ $\Rightarrow$ shade between solutions

For $>$ or $\geq$ $\Rightarrow$ shade outside of solutions

4) Final answer can be expressed in

- Graphing
- interval notation
- Set-Builder notation

Ex:

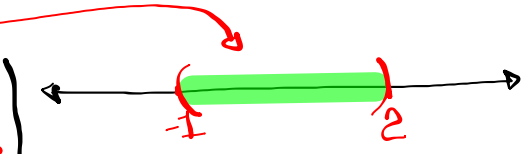
Solve $|2x-1| < 3$

Solve $|2x-1| = 3$

$2x-1=3$ OR $2x-1=-3$

$2x=4$ $\quad$ $2x=-2$

$\boxed{x=2}$ $\quad$ $\boxed{x=-1}$

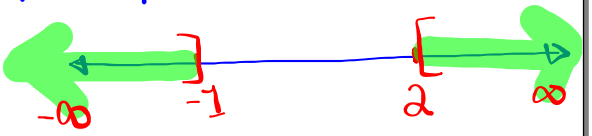


I.N. $(-1,2)$

S.B.N. $\{x \mid -1<x<2\}$

If we were Solving $|2x-1| \geq 3$

I.N. $(-\infty,-1] \cup [2,\infty)$ (∪ = union)



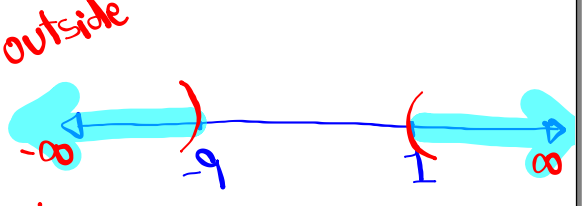
S.B.N. $\{x \mid x \leq -1 \text{ OR } x \geq 2\}$

Solve $|x+4| > 5$ ← shade outside

Solve $|x+4| = 5$

$x+4=5$ OR $x+4=-5$

$\boxed{x=1}$ OR $\boxed{x=-9}$



I.N. $(-\infty,-9) \cup (1,\infty)$

S.B.N. $\{x \mid x<-9 \text{ OR } x>1\}$

If we were Solving $|x+4| \leq 5$

I.N. $[-9,1]$

S.B.N. $\{x \mid -9 \leq x \leq 1\}$

Solve $2|3x-1|-6<12$

$+6 \quad +6$

$2|3x-1|<18$

Always isolate the abs. value

get 1 $\rightarrow$ $|3x-1|<\frac{18}{2}$ $\Rightarrow |3x-1|<9$

shade between

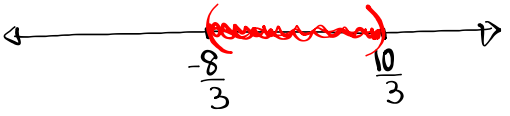
use (,)

Solve $|3x-1|=9$

$3x-1=9$ OR $3x-1=-9$

$3x=10$ $3x=-8$

$x=\frac{10}{3}$ $x=\frac{-8}{3}$



I.N. $\left(\frac{-8}{3},\frac{10}{3}\right)$

S.B.N. $\left\{x \mid \frac{-8}{3}<x<\frac{10}{3}\right\}$

Solve $-3|x+2|+5 \leq -4$

$-5 \quad -5$

$-3|x+2| \leq -9$

Divide by -3

$|x+2| \geq \frac{-9}{-3}$

Always isolate the abs. value.

$|x+2| \geq 3$ shade outside

Solve $|x+2|=3$

$x+2=3$ OR $x+2=-3$

$x=1$ $x=-5$

I.N. $(-\infty,-5] \cup [1,\infty)$

S.B.N. $\{x \mid x \leq -5 \text{ OR } x \geq 1\}$

IF $k<0$,

$|ax+b|<k \Rightarrow \emptyset$

$|ax+b|>k \Rightarrow \mathbb{R}, (-\infty,\infty)$

Solve $|5x-3|<-8$ $\quad \emptyset$

Solve $|3x+5|>-8$ $\quad \mathbb{R}$, $(-\infty,\infty)$

Be aware of these cases.

Class Qz 3

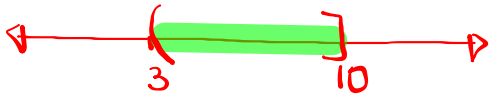
Solve $-1<2x-7\leq 13$

express final answer in graphing, interval notation, and Set-Builder notation.

$-1+7<2x\leq 13+7$

$6<2x\leq 20$

$3<x\leq 10$



I.N. $(-3,10]$, S.B.N. $\{x \mid 3<x\leq 10\}$