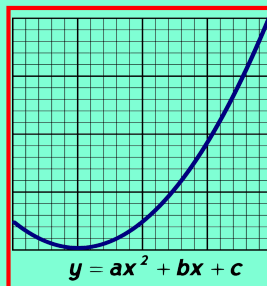


Math 125
Fall 2021
Lecture 18



Class QZ 13

Solve $|2x - 3| < 7$.

Solve $|2x - 3| = 7$

$$2x - 3 = 7 \quad \text{OR} \quad 2x - 3 = -7$$

$$2x = 10$$

$$x = 5 \checkmark$$

$$2x = -4$$

$$x = -2 \checkmark$$



S.B.N. $\{x \mid -2 < x < 5\}$

I.N. $(-2, 5)$

Express ans in
graphing, S.B.N., and

I.N.

Your work must be
similar to the
lecture.

Solve $3(x-1) + 5 \geq 7$ **OR** $-3x + 8 > 2x + 18$

$$3x - 3 + 5 \geq 7$$

$$3x + 2 \geq 7$$

$$3x \geq 7 - 2$$

$$3x \geq 5$$

$$x \geq \frac{5}{3} \quad \text{OR}$$

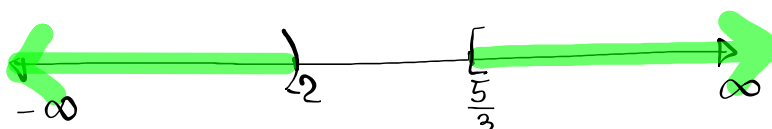
$$-3x - 2x > 18 - 8$$

$$-5x > 10$$

Divide by -5

$$\frac{-5}{-5}x < \frac{10}{-5}$$

$$x < -2$$



S.B.N. $\{x \mid x < -2 \text{ OR } x \geq \frac{5}{3}\}$

I.N. $(-\infty, -2) \cup [\frac{5}{3}, \infty)$

IF OR was AND

\Rightarrow There is no overlap

$\Rightarrow \emptyset$

Solve $2(x+3) - 4 \geq 4x - 10$ **AND** $-5x - 10 < 0$

$$2x + 6 - 4 \geq 4x - 10$$

$$2x + 2 \geq 4x - 10$$

$$2x - 4x \geq -10 - 2$$

$$-2x \geq -12$$

Divide by -2

$$\frac{-2}{-2}x \leq \frac{-12}{-2}$$

$$x \leq 6$$

$$-5x < 10$$

Divide by -5

$$\frac{-5}{-5}x > \frac{10}{-5}$$

$$x > -2$$



S.B.N. $\{x \mid -2 < x \leq 6\}$

I.N. $(-2, 6]$

IF AND was OR

\Rightarrow Take whatever

Shaded

$\Rightarrow (-\infty, \infty) = \mathbb{R}$

Solve $-4|-2x+3|-6 \geq -2$

Always isolate the Abs. Value.

$$-4|-2x+3| \geq -2+6$$

$$-4|-2x+3| \geq 4$$

Divide by -4

$$\frac{-4}{-4}|-2x+3| \leq \frac{4}{-4}$$

$$|-2x+3| \leq -1$$

No Solution
 \emptyset

Abs. Value ≥ 0 so $|-2x+3| \leq -1 \rightarrow$ False
Or +

$$|ax+b| < -\# \Rightarrow \text{No Solution}$$

$$|ax+b| \leq -\# \Rightarrow "$$

$$|ax+b| > -\# \Rightarrow \text{All Real numbers}$$

$$\text{Solve } |3x-4| > -5 \Rightarrow \text{All Reals, } \mathbb{R}$$

$$\text{Solve } |2x+7| < -5 \Rightarrow \text{Impossible} \Rightarrow \text{NO Soln.}$$

Always isolate the Abs. Value. \emptyset

$$f(x) = 3x - 5$$

Solve $-2 \leq f(x) < 4$

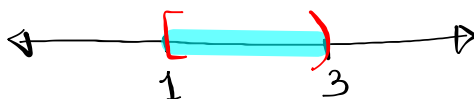
$$-2 \leq 3x - 5 < 4$$

$$-2 + 5 \leq 3x - 5 + 5 < 4 + 5$$

$$3 \leq 3x < 9$$

$$\frac{3}{3} \leq \frac{3}{3}x < \frac{9}{3}$$

$$1 \leq x < 3$$



S.B.N. $\{x | 1 \leq x < 3\}$

I.N. $[1, 3)$

Given $f(x) = 2x - 7$

1) Solve $|f(x)| = -5 \Rightarrow \text{Solve } |2x-7| = -5$
 \emptyset

2) Solve $|f(x)| = 5 \Rightarrow \text{Solve } |2x-7| = 5$

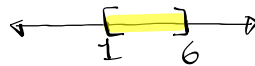
$2x-7=5$	OR	$2x-7=-5$
$2x=12$		$2x=2$
$x=6$		$x=1$

$\hookrightarrow \{1, 6\}$

3) Solve $|f(x)| \leq 5$

S.B.N. $\{x \mid 1 \leq x \leq 6\}$

I.N. $[1, 6]$



4) Solve $|f(x)| \geq 5$

S.B.N. $\{x \mid x \leq 1 \text{ OR } x \geq 6\}$

I.N. $(-\infty, 1] \cup [6, \infty)$



Given $f(x) = 3x + 2$

1) Solve $|f(x)| = -4 \Rightarrow |3x+2| = -4$
 \emptyset

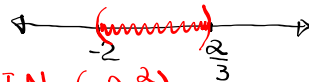
2) Solve $|f(x)| = 4 \Rightarrow |3x+2| = 4$

$3x+2=4$	OR	$3x+2=-4$
$3x=2$		$3x=-6$
$x=\frac{2}{3}$		$x=-2$

$\downarrow \{ -2, \frac{2}{3} \}$

3) Solve $|f(x)| < 4$

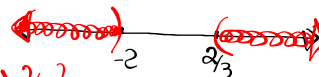
S.B.N. $\{x \mid -2 < x < \frac{2}{3}\}$, I.N. $(-2, \frac{2}{3})$



4) Solve $|f(x)| > 4$

S.B.N. $\{x \mid x < -2 \text{ OR } x > \frac{2}{3}\}$

I.N. $(-\infty, -2) \cup (\frac{2}{3}, \infty)$



Simplify $\frac{x^3 - 36x}{x^2 + 12x + 36} = \frac{x(x^2 - 36)}{x^2 + 12x + 36}$

$$= \frac{x(x-6)(\cancel{x+6})}{(x+6)(\cancel{x+6})}$$

$$= \boxed{\frac{x(x-6)}{x+6}}$$

Simplify $\frac{x^2 - 4}{x^2 - 9} \div \frac{x^2 + 4x + 4}{x^2 - 6x + 9}$

$$= \frac{x^2 - 4}{x^2 - 9} \cdot \frac{x^2 - 6x + 9}{x^2 + 4x + 4}$$

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

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

Solve

$$\frac{x}{2} - \frac{1}{3} = \frac{5}{6}$$

Hint: Multiply
by LCD.

$$\text{LCD} = 2 \cdot 3 = 6$$

$$\overset{3}{\cancel{6}} \cdot \frac{x}{\cancel{2}} - \overset{2}{\cancel{6}} \cdot \frac{1}{\cancel{3}} = \overset{1}{\cancel{6}} \cdot \frac{5}{\cancel{6}}$$

$$3x - 2 = 5$$

$$3x = 7$$

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

 $\left\{ \frac{7}{3} \right\}$
Solution
Set

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

Hint: multiply everything by LCD

$$\text{LCD} = (x-2)(x+2)$$

$$\cancel{(x-2)}(x+2) \cdot \frac{2}{\cancel{x-2}} - \cancel{(x-2)}(x+2) \cdot \frac{1}{\cancel{x+2}} = \cancel{(x-2)}(x+2) \cdot \frac{5}{\cancel{x^2-4}}$$

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

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

$$x + 6 = 5$$

$$x = -1$$

$$\{-1\}$$

Be aware
LCD $\neq 0$

$$(x-2)(x+2) \neq 0$$

$$x-2 \neq 0 \quad x+2 \neq 0$$

$$x \neq 2 \quad x \neq -2$$

Excluded Values

Solve $\frac{2}{x-3} + \frac{1}{x+3} = \frac{9}{x^2-9}$

$$\text{LCD} = (x-3)(x+3)$$

$$\cancel{(x-3)}(x+3) \cdot \frac{2}{\cancel{x-3}} + \cancel{(x-3)}(x+3) \cdot \frac{1}{\cancel{x+3}} = \cancel{(x-3)}(x+3) \cdot \frac{9}{\cancel{x^2-9}}$$

$$2(x+3) + 1(x-3) = 9$$

$$2x + 6 + x - 3 = 9$$

$$3x + 3 = 9$$

$$3x = 6$$

$$\boxed{x=2}$$

{2}

Be aware

$$\text{LCD} \neq 0$$

$$(x-3)(x+3) \neq 0$$

$$x-3 \neq 0 \quad x+3 \neq 0$$

$$\boxed{x \neq 3 \quad x \neq -3}$$

E.V.

Solve $\frac{2}{x-3} + \frac{1}{x+3} = \frac{12}{x^2-9}$

$$\text{LCD} = (x-3)(x+3)$$

$$\cancel{(x-3)}(x+3) \cdot \frac{2}{\cancel{x-3}} + \cancel{(x-3)}(x+3) \cdot \frac{1}{\cancel{x+3}} = \cancel{(x-3)}(x+3) \cdot \frac{12}{\cancel{x^2-9}}$$

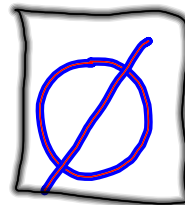
$$2(x+3) + 1(x-3) = 12$$

$$2x + 6 + x - 3 = 12$$

$$3x + 3 = 12$$

$$3x = 9$$

$$\boxed{x=3}$$



Be aware

$$\text{LCD} \neq 0$$

$$(x-3)(x+3) \neq 0$$

$$x-3 \neq 0 \quad x+3 \neq 0$$

$$\boxed{x \neq 3 \quad x \neq -3}$$

E.V.

Class QZ 14

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

$$|2x-1| \leq 9$$

$$|2x-1| = 9$$

$$2x-1 = 9$$

$$2x = 10$$

$$x = 5$$

$$2x-1 = -9$$

$$2x = -8$$

$$x = -4$$

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. $[-4, 5]$