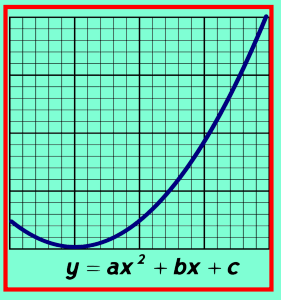
Math 125

Fall 2021

Lecture 17



Class QZ 12

Solve $|3x - 5| = |-2x + 10|$

$3x - 5 = -2x + 10$ OR $3x - 5 = -(-2x + 10)$

$3x + 2x = 10 + 5$

$5x = 15$

$x = 3$ ✓

$3x - 5 = 2x - 10$

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

$x = -5$ ✓

Solution Set $\{-5, 3\}$

More with inequalities

1) Compound inequalities with OR

a) Solve & graph

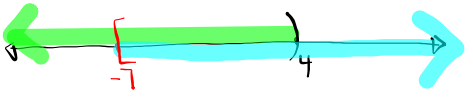
b) take all the shaded segments to a new graph.

c) express answer in S.B.N. & I.N.

Solve $2x-3<5$ OR $-3x+1\leq 22$

$2x<8$ $\quad -3x\leq 21$

$x<4$ $\quad x\geq -7$



Final Graph

S.B.N. $\{x \mid x \text{ is a real number}\} = \{x \mid x \in \mathbb{R}\}$

I.N. $(-\infty, \infty)$

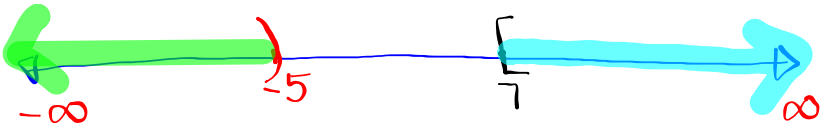
Solve

$3x-4\geq x+10$ OR $5x+3<3x-7$

$3x-x\geq 10+4$ $\quad 5x-3x<-7-3$

$2x\geq 14$ $\quad 2x<-10$

$x\geq 7$ OR $x<-5$



S.B.N. $\{x \mid x<-5 \text{ OR } x\geq 7\}$

I.N. $(-\infty,-5) \cup [7,\infty)$

Solve $-2(x-1)+5 \leq x+7$ OR $3(x-1)-5(x+1) \geq 0$

$-2x+2+5 \leq x+7$

$-2x+7 \leq x+7$

$-2x-x \leq 7-7$

$-3x \leq 0$

$\frac{-3}{-3}x \geq \frac{0}{-3}$

$x \geq 0$

OR

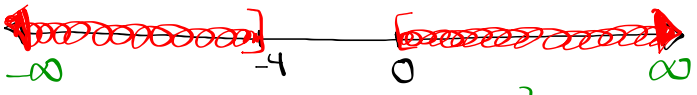
$3x-3-5x-5 \geq 0$

$-2x-8 \geq 0$

$-2x \geq 8$

$\frac{-2}{-2}x \leq \frac{8}{-2}$

$x \leq -4$



S.B.N. $\{x \mid x \leq -4 \text{ OR } x \geq 0\}$

I.N. $(-\infty, -4] \cup [0, \infty)$

More with inequalities

2) Compound inequalities with AND

a) Solve & graph

b) take only the common shaded segments to a new graph.

c) express answer in S.B.N. & I.N.

Solve $2x-1>5$ AND $-3x+1 \geq 10$

$2x>6$

$x>3$ AND

$-3x \geq 9$

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

$x \leq -3$

NO overlap

NO Solution

$\emptyset$

Solve $2(x+3)-1>-3$ AND $-2x-7\geq -17$

$2x+6-1>-3$

$2x+5>-3$

$2x>-3-5$

$2x>-8$

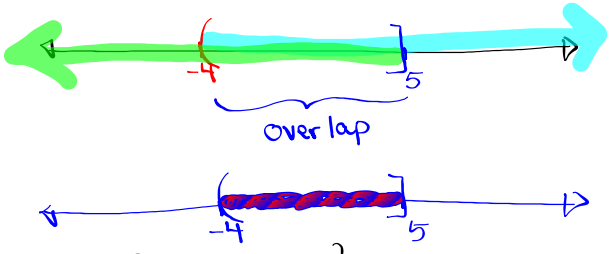
$x>-4$ AND

$-2x\geq -17+7$

$-2x\geq -10$

$\frac{-2}{-2}x\leq\frac{-10}{-2}$

$x\leq 5$



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

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

SG 5 & SG 6

Solve $-2|3x-1|+3\leq -5$

Always isolate the Abs. Value.

$-2|3x-1|\leq -5-3$

$-2|3x-1|\leq -8$

$\frac{-2}{-2}|3x-1|\geq\frac{-8}{-2}\Rightarrow |3x-1|\geq 4$

shade outside

Solve $|3x-1|=4$

$3x-1=4$

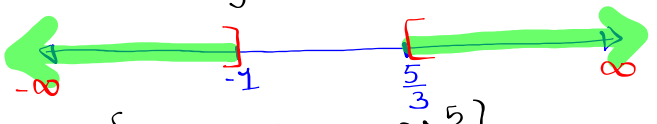
$3x=5$

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

$3x-1=-4$

$3x=-3$

$x=-1$



S.B.N. $\{x\mid x\leq -1 \text{ OR } x\geq\frac{5}{3}\}$

I.N. $(-\infty,-1]\cup[\frac{5}{3},\infty)$

Solve $-3|2x+3|+10 > -2$

Isolate the Abs. Value

$-3|2x+3| > -12$

Divide by -3

$\frac{-3}{-3}|2x+3| < \frac{-12}{-3} \Rightarrow |2x+3| < 4$

Solve $|2x+3| = 4$

$2x+3=4$

$2x=1$

$x=\frac{1}{2}$

$2x+3=-4$

$2x=-7$

$x=\frac{-7}{2}$

shade inside

S.B.N. $\left\{x \mid -\frac{7}{2} < x < \frac{1}{2}\right\}$

I.N. $\left(-\frac{7}{2}, \frac{1}{2}\right)$

Simplify: $\frac{x^2-4x+3}{x^2-9}$

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

Simplify: $\frac{4}{x^2-3x-4} + \frac{2}{x^2-16}$

$= \frac{4(x+4)}{(x-4)(x+1)(x+4)} + \frac{2(x+1)}{(x-4)(x+4)(x+1)}$

$= \frac{4(x+4) + 2(x+1)}{(x-4)(x+1)(x+4)}$

$= \frac{4x+16+2x+2}{(x-4)(x+1)(x+4)} = \boxed{\frac{6x+18}{(x-4)(x+1)(x+4)}}$

Simplify $\frac{6}{25} \cdot \frac{15}{27}$

$= \frac{2 \cdot 3}{5 \cdot 5} \cdot \frac{5 \cdot 3}{3 \cdot 3 \cdot 3} = \boxed{\frac{2}{15}}$

Simplify $\frac{x^2-4}{x^2+3x+2} \cdot \frac{x^2+6x+5}{x^2-25}$

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

WORK on SG 5 & SG 6

$= \boxed{\frac{x-2}{x-5}}$

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

Find

1) $f(0) = |0-5|$
$= |-5| = \boxed{5}$

2) $f(5) = |5-5|$
$= |0| = \boxed{0}$

3) $f(-5) = |-5-5| = |-10| = \boxed{10}$

4) Solve $f(x) = 10$

$|x-5| = 10$

$x-5 = 10$
$x = 15$

$x-5 = -10$
$x = -5$

$\{-5, 15\}$

Class QZ 13

Solve $|2x-3|<7$. Express ans in graphing, S.B.N., and I.N.

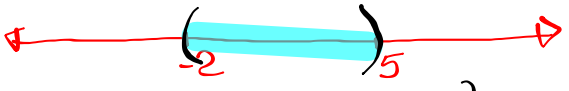
Your work must be similar to the lecture.

Solve $|2x-3|=7$

$2x-3=7$ OR $2x-3=-7$

$2x=10$ $\quad 2x=-4$

$x=5$ $\quad x=-2$



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

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