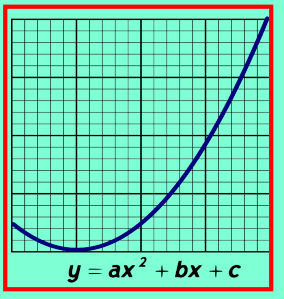
Math 125

Spring 2021

Lecture 7



Class Qz 6

$f(x) = 4x - 3$ $\quad g(x) = x + 5$

1) $(f+g)(x) = f(x) + g(x)$

$= 4x - 3 + x + 5$

$= \boxed{5x + 2}$

2) $(f-g)(x)$

$= f(x) - g(x)$

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

$= 4x - 3 - x - 5$

$= \boxed{3x - 8}$

3) $(f \cdot g)(x)$

$= f(x) \cdot g(x)$

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

$= 4x^2 + 20x - 3x - 15$

$= \boxed{4x^2 + 17x - 15}$

4) $\left(\frac{f}{g}\right)(x)$

$= \frac{f(x)}{g(x)}$; $g(x) \neq 0$

$= \frac{4x-3}{x+5}$ $\quad x + 5 \neq 0$

$x \neq -5$

Solve $-6 < -4x + 2 \leq 2$

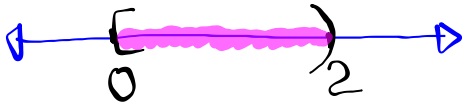
$-6-2 < -4x + 2 - 2 \leq 2-2$

$-8 < -4x \leq 0$

$\frac{-8}{-4} > \frac{-4}{-4}x \geq \frac{0}{-4}$

$2 > x \geq 0$ ✓

$\Rightarrow 0 \leq x < 2$ ✓



S.B.N. $\{x \mid 0 \leq x < 2\}$

I.N. $[0, 2)$

$A = \{3, 4, 5, 6\}$ $B = \{5, 7, 8, 9\}$

Find

1) $A \cup B$

$= \{3, 4, 5, 6, 7, 8, 9\}$

2) $A \cap B$

$= \{5\}$

Given $f(x) = -x^2 + 64$

Find:

1) $f(0) = -(0)^2 + 64$

$= 64$

2) $f(8)$

$= -(8)^2 + 64$

$= -64 + 64$

$= 0$

3) $f(-8)$

$= -(-8)^2 + 64$

$= -64 + 64$

$= 0$

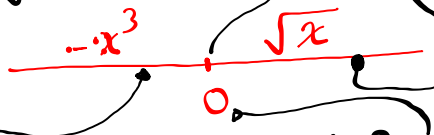
$$f(x)=\begin{cases} -x^3 & ; \ x<0 \\ \sqrt{x} & ; \ x\geq 0 \end{cases}$$

Find

1) $f(-2) = -(-2)^3$
$= -(-8)$
$= \boxed{8}$

2) $f(0) = \sqrt{0}$
$= \boxed{0}$

3) $f(100) = \sqrt{100}$
$= \boxed{10}$



Find the domain:

1) $f(x)=\frac{8}{x}$

$x\neq 0$ $(-\infty,0)\cup(0,\infty)$

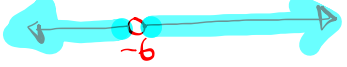
2) $f(x)=\frac{x-2}{x-1}$

$x-1\neq 0$ $x\neq 1$

$(-\infty,1)\cup(1,\infty)$

3) $f(x)=\frac{x^2}{x+6}$

$x+6\neq 0 \Rightarrow x\neq -6$

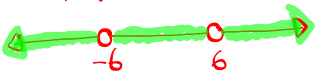


$(-\infty,-6)\cup(-6,\infty)$

4) $f(x)=\frac{-10}{x^2-36}$

$x^2-36\neq 0$ $x^2\neq 36$

$x\neq \pm 6$



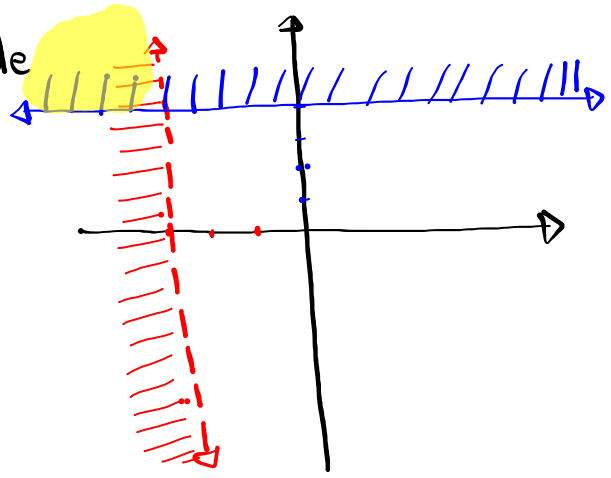
$(-\infty,-6)\cup(-6,6)\cup(6,\infty)$

$\{x \mid x\neq \pm 6\}$

$\{x \mid x<-6$ or $-6<x<6$, or $x>6\}$

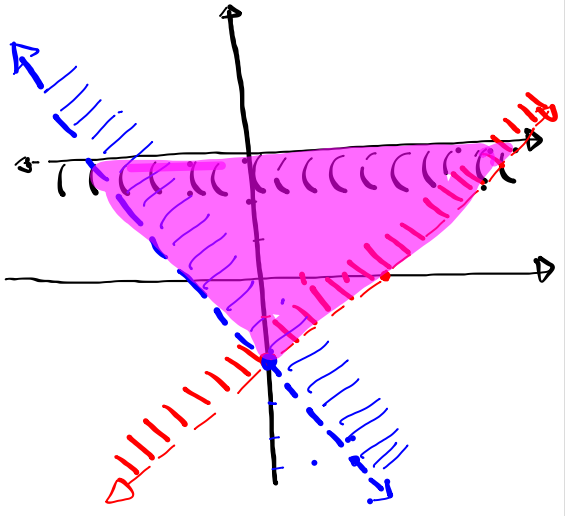
Graph & shade

$$\begin{cases} x < -3 \\ y \geq 4 \end{cases}$$



Graph & Shade

$$\begin{cases} y \leq 3 \\ y > \frac{2}{3}x - 2 \\ y > \frac{-3}{2}x - 2 \end{cases}$$



Horizontal line $\Leftrightarrow$ y-only $\Leftrightarrow$ $y=b$

Zero Slope

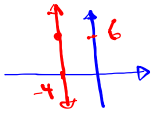
Vertical line $\Leftrightarrow$ x-only $\Leftrightarrow$ $x=a$

No Slope

Undefined Slope

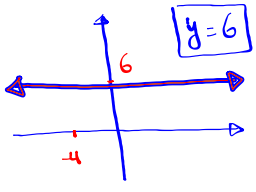
Consider the Point A $(-4,6)$

1) Find equation of a line with no slope.



$x=-4$ $\Leftarrow$ x-only $\Leftarrow$ V.L.

2) Find equation of a line with Zero Slope.



$y=6$ $\Leftarrow$ y-only $\Leftarrow$ H.L.

SG 4

Solve $|5x-3|=7$

Solve $|ax+b|=K$

No solution when $K<0$

otherwise $ax+b=K$ OR $ax+b=-K$

Solve $5x-3=7$ OR $5x-3=-7$

$5x=10$ $5x=-4$

$x=2$ $x=\frac{-4}{5}$

$\left\{\frac{-4}{5}, 2\right\}$

Solve $|3x+4|-2=8$

Hint: Isolate abs. value.

$|3x+4|=10$ ✓

Solve $3x+4=10$ OR $3x+4=-10$

$3x=6$ $\quad$ $3x=-14$

$x=2$ $\quad$ $x=\frac{-14}{3}$

$\left\{\frac{-14}{3}, 2\right\}$

Solve $-2|x+8|-3=5$

Hint: Isolate abs. value first.

$-2|x+8|=8$

Product

$\frac{-2}{-2}|x+8|=\frac{8}{-2}$

$|x+8|=$

No Solution

$\{\ \}$ $\quad$ $\{\emptyset\}$ $\quad$ $\emptyset$

No Solution

1) Exam 1: One week from Monday
   1) Camera On
   2) Mic On
   3) I must Confirm Your exam before You leave.
   4) Exam, then Lecture.
   5) SG 1-6

Pick up the Pace

Abs. Value Inequalities $K > 0$

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

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

1) Isolate the abs. value.
2) Solve $|ax+b| = K$
3) Place Your Solutions on the number line System.
4) For $|ax+b| < K$, $|ax+b| \leq K$
   Shade between
   For $|ax+b| > K$, $|ax+b| \geq K$
   Shade outside
5) Be prepared to give Final ans in **S.B.N.** or **I.N.**

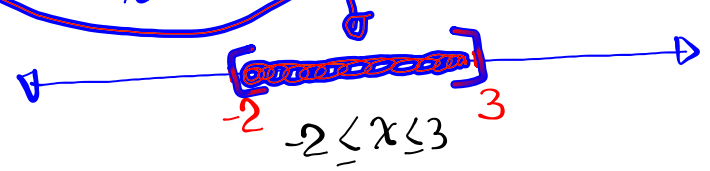
Solve $|2x-1| \leq 5$

Solve $|2x-1|=5$

$2x-1=5$ OR $2x-1=-5$

$2x=6$ $2x=-4$

$x=3$ $x=-2$



$-2 \leq x \leq 3$

S.B.N. $\{x \mid -2 \leq x \leq 3\}$ I.N. $[-2,3]$

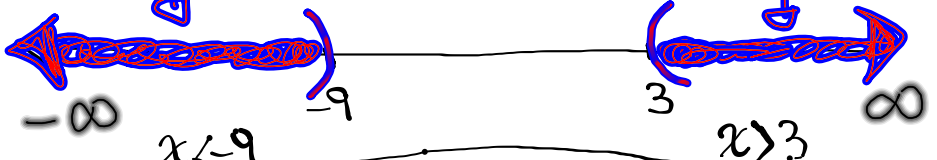
Solve $|x+3|-2 > 4$

$|x+3| > 6$

Solve $|x+3|=6$

$x+3=6$ OR $x+3=-6$

$x=3$ $x=-9$



$x<-9$ $x>3$

S.B.N. $\{x \mid x<-9 \text{ or } x>3\}$ I.N. $(-\infty,-9) \cup (3,\infty)$

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

Hint: Always isolate Abs. Value

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

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

Solve $|2x+3| = 2$

$2x+3=2$ $\quad$ $2x+3=-2$

$2x=-1$ $\quad$ $2x=-5$

$x=\frac{-1}{2}$ $\quad$ $x=\frac{-5}{2}$

S.B.N.: $\left\{x \mid x \leq \frac{-5}{2} \text{ OR } x \geq \frac{-1}{2}\right\}$

I.N.: $\left(-\infty, \frac{-5}{2}\right] \cup \left[\frac{-1}{2}, \infty\right)$

Solving inequalities with OR

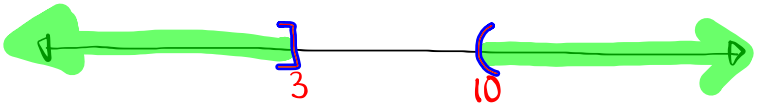
1) Solve & Graph on the Same number line System.

2) Final answer is whatever Shaded.

Solve $3x-1 \leq 8$ OR $-2x+7 < -13$

$3x \leq 9$ $\quad$ $-2x < -20$

$x \leq 3$ $\quad$ $x > 10$



S.B.N. $\{x \mid x \leq 3 \text{ OR } x > 10\}$ $\quad$ I.N. $(-\infty, 3] \cup (10, \infty)$

Solving inequalities with AND:

1) Graph & shade on the same number line system.

2) Final answer is the overlapping shaded segment

Solve $-2x-8>10$ AND $4x+8\geq 60$

$-2x>18$

$\frac{-2}{-2}x<\frac{18}{-2}$

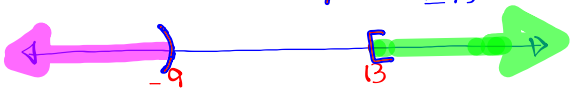
$x<-9$

$4x\geq 52$

$x\geq\frac{52}{4}$

$x\geq 13$

overlap



NO overlap

NO Solution $\varnothing$ $\{\ \}$

Solve $|3x-7|>-10$

0 or +

All Real numbers

$\mathbb{R}$

$(-\infty,\infty)$

Solve $|5x+3|<-8$

0 or +

$\varnothing$

$\{\ \}$

NO Solution

Class QZ 7

① Graph and Shade

$$\begin{cases} y > -2 \\ y \leq \frac{-3}{4}x + 3 \end{cases}$$

② Solve

$$|2x-7| = |x-8|$$