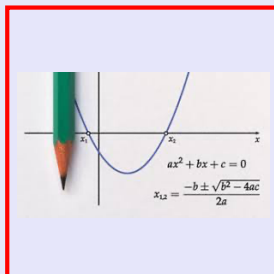


Math 125
Spring 2022
Lecture 9



Class QZ 7

Factor Completely

$$1) \ x^2 - x - 6 = (x - 3)(x + 2)$$

1, -6

2, -3

$$2) \ x^3 + 1000 = x^3 + 10^3 = (x + 10)(x^2 - 10x + 100)$$

$A^3 + B^3$

$A^3 + B^3 =$

$$3) \ 3x^2 - 75x = 3x(x - 25)$$

$(A + B)(A^2 - AB + B^2)$

Solve $|3x-6|=9$

$3x-6=9$ OR $3x-6=-9$

$3x=15$ $3x=-3$

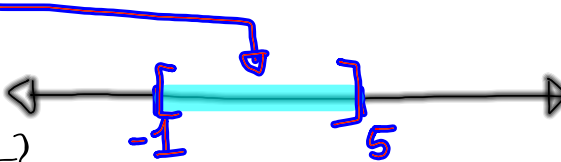
$x=5$ $x=-1$

$\{-1, 5\}$

Solve $|3x-6| \leq 9$

I.N. $[-1, 5]$


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



Solve $|3x-6| > 9$

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

S.B.N. $\{x \mid x < -1 \text{ OR } x > 5\}$



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

Isolate Abs. Value

$2|x+2|=8$ $x+2=4$ OR $x+2=-4$

$|x+2|=4$ $x=2$ $x=-6$

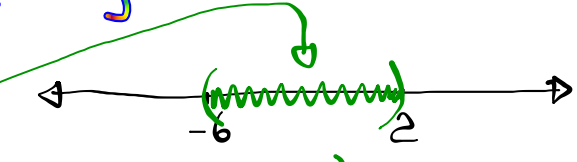
$\{-6, 2\}$

Solve $2|x+2|-3 < 5$

$|x+2| < 4$

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

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

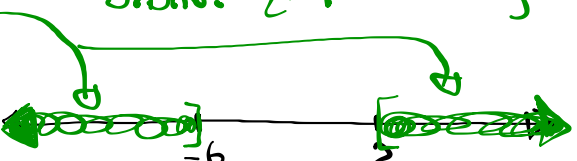


Solve $2|x+2|-3 \geq 5$

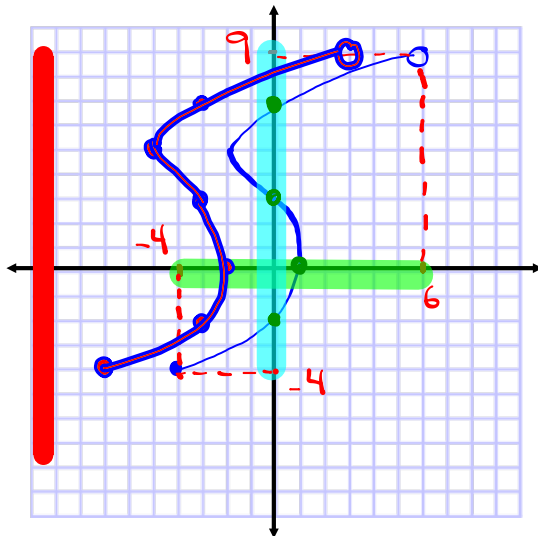
$|x+2| \geq 4$

I.N. $(-\infty, -6] \cup [2, \infty)$

S.B.N. $\{x \mid x \leq -6 \text{ OR } x \geq 2\}$



Consider the graph below:



1) Domain $[-4, 6)$

2) Range $[-4, 9)$

3) Function or not?
 Explain Fails V.L.T.

4) All intercepts

x-Int: $(1, 0)$

y-Int: $(0, -2), (0, 3), (0, 7)$

5) move this graph 3 units left

$f(x) = 2x - 5$, $g(x) = 2x + 5$

Find

1) $(f + g)(x) = f(x) + g(x)$
 $= 2x - 5 + 2x + 5 = 4x$

2) $(f - g)(x) = f(x) - g(x)$
 $= 2x - 5 - (2x + 5) = 2x - 5 - 2x - 5 = -10$

3) $(f \cdot g)(x) = f(x) \cdot g(x)$
 $= (2x - 5)(2x + 5) = 4x^2 + 10x - 10x - 25 = 4x^2 - 25$

4) $\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)} ; g(x) \neq 0$
 $= \frac{2x - 5}{2x + 5}$
 $2x + 5 \neq 0$
 $2x \neq -5$
 $x \neq -\frac{5}{2}$

Domain: All Reals except $-\frac{5}{2}$

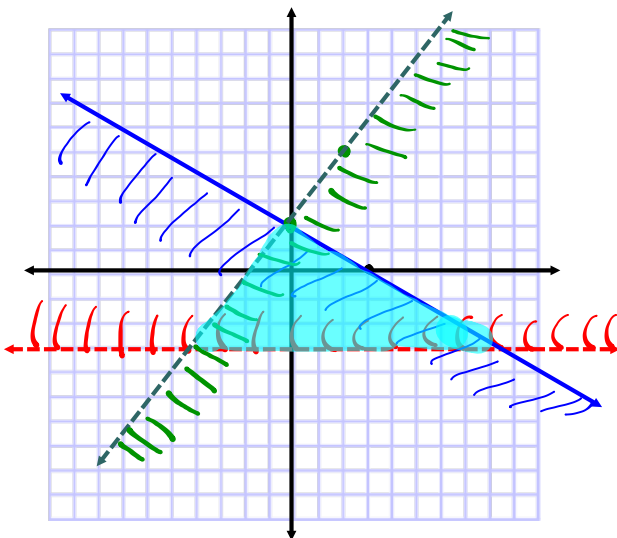
find the domain, give answer in interval notation

1) $f(x) = \frac{x}{x-9}$ \rightarrow $x-9 \neq 0$
 $x \neq 9$ \rightarrow $(-\infty, 9) \cup (9, \infty)$

2) $g(x) = \frac{x}{x^2-81}$ \rightarrow $x^2-81 \neq 0$
 $x^2 \neq 81$
 $x \neq \pm 9$
 $(-\infty, -9) \cup (-9, 9) \cup (9, \infty)$

Graph & shade:

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



Solve, give answer in graphing, interval notation and Set-Builder notation.

$$-2 < \underline{2} - 4x \leq 22$$

$$-2 < -4x + 2 \leq 22$$

$$-2-2 < -4x + 2-2 \leq 22-2$$

$$-4 < -4x \leq 20$$

$$\frac{-4}{-4} > \frac{-4}{-4}x \geq \frac{20}{-4}$$

$$1 > x \geq -5$$

$$-5 \leq x < 1$$



I.N. $[-5, 1)$

S.B.N. $\{x \mid -5 \leq x < 1\}$

Such that

$\{x : -5 < x \leq 1\}$

Solve

$$1) \quad -3|2x-1|-6 > 0$$

$$-3|2x-1| > 6$$

$$|2x-1| < \frac{6}{-3}$$

$$\rightarrow |2x-1| < -2$$

0 or +

No Solution

$\{ \}, \emptyset$

$$2) \quad \frac{1}{2}|3x+2|+3 > 0$$

$$\frac{1}{2}|3x+2| > -3$$

$$|3x+2| > -6$$

0 or +

All Reals

$(-\infty, \infty)$

\mathbb{R}

Exam 1:

Camera must be on.

Thursday

Lecture, then Exam.

System of linear equations in two variables:

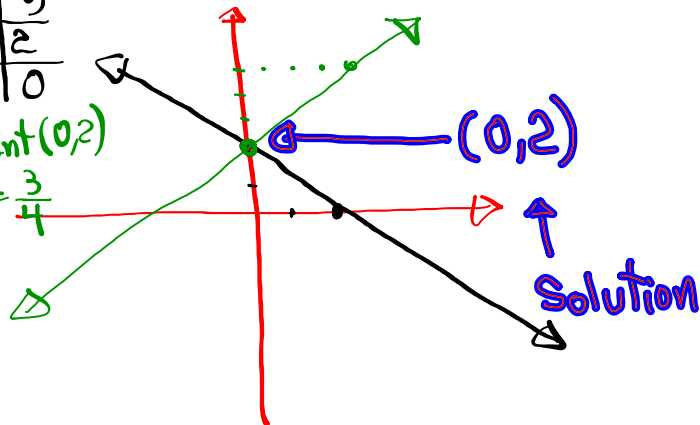
$$\begin{cases} x + y = 2 \\ y = \frac{3}{4}x + 2 \end{cases}$$

| x | y |
|---|---|
| 0 | 2 |
| 2 | 0 |

Y-Int (0,2)

$$m = \frac{3}{4}$$

1) Graphing



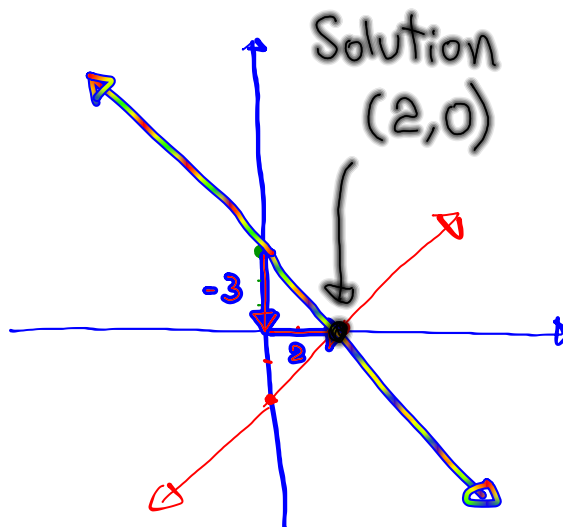
Solve by graphing

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

| x | y |
|---|----|
| 0 | -2 |
| 2 | 0 |

Y-Int (0,3)

$$m = -\frac{3}{2}$$



Solve

$$\begin{cases} 2x + y = 5 \\ y = x - 1 \end{cases} \quad \begin{aligned} 2x + x - 1 &= 5 \\ 3x - 1 &= 5 \\ 3x &= 6 \\ x &= 2 \end{aligned}$$

$y = 2 - 1$
 $y = 1$

Final Ans: (2, 1) Substitution method

Solve

$$\begin{cases} 3x - 2y = 7 \\ y = x - 2 \end{cases} \quad \begin{aligned} 3x - 2(x - 2) &= 7 \\ 3x - 2x + 4 &= 7 \\ x + 4 &= 7 \\ x &= 3 \end{aligned}$$

$y = 3 - 2$
 $y = 1$

Solution Set $\{(3, 1)\}$

Solve

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

$$2x = 8$$

$$x = \frac{8}{2}$$

$$x = 4$$

$$4 + y = 6$$

$$y = 2$$

Final Ans (4, 2)
 Method: Addition

Solve

$$\begin{cases} 3x + 2y = -15 \\ 2x - 2y = -5 \end{cases}$$

$$5x = -20$$

$$x = \frac{-20}{5}$$

$$x = -4$$

$$3(-4) + 2y = -15$$

$$-12 + 2y = -15$$

$$2y = -3$$

$$y = \frac{-3}{2}$$

$$y = -1.5$$

Final Ans $(-4, -1.5)$

Solve by graphing

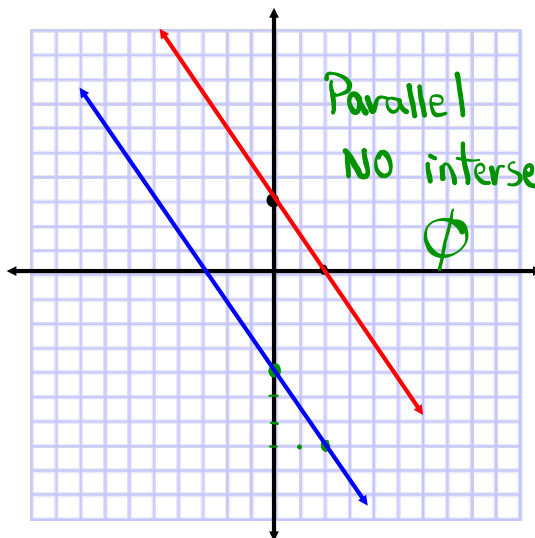
$$3x + 2y = 6$$

$$y = \frac{-3}{2}x - 4$$

| x | y |
|---|---|
| 0 | 3 |
| 2 | 0 |

Y-Int $(0, -4)$

$$m = \frac{-3}{2}$$



Parallel
NO intersection
 \emptyset

Solve by Subs. method:

$$\begin{cases} 2x + y = 8 \\ y = -4 - 2x \end{cases} \quad \begin{matrix} \cancel{2x} - \cancel{4 - 2x} = 8 \\ -4 = 8 \\ \text{False} \\ \emptyset \end{matrix}$$

Solve by addition

$$\begin{cases} x - y = 5 \\ 3x - 3y = 15 \end{cases} \quad \begin{matrix} -3 \begin{cases} x - y = 5 \\ 3x - 3y = 15 \end{cases} \\ \begin{cases} -3x + 3y = -15 \\ 3x - 3y = 15 \end{cases} \\ \hline 0 = 0 \\ \text{True} \end{matrix}$$

infinite # of solutions.

Class QZ 8

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

Express final Ans in interval notation and graphing.

$$|2x-1| < 9$$



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

$$2x-1=9 \quad \text{OR} \quad 2x-1=-9$$

$$\boxed{x=5}$$

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

I.N. $\Rightarrow (-4, 5)$