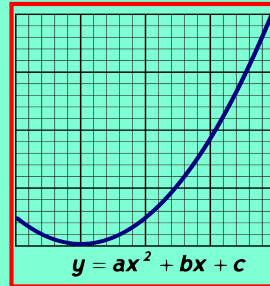


Math 125

Fall 2021

Lecture 9



Class QZ 7

$$f(x) = mx + b$$

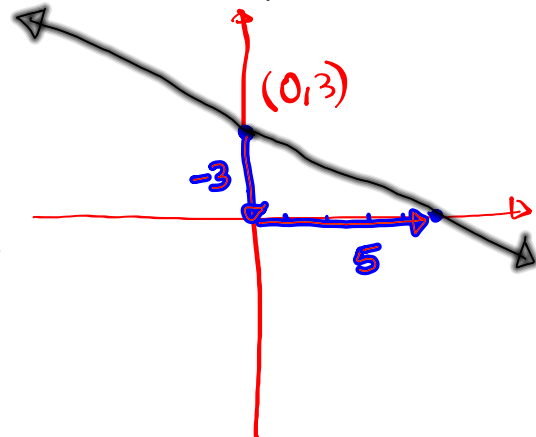
$$f(x) = \frac{-3}{5}x + 3$$

Find

$$\begin{aligned} f(0) &= \frac{-3}{5}(0) + 3 \\ &= 0 + 3 = \boxed{3} \checkmark \end{aligned}$$

$$\begin{aligned} f(5) &= \frac{-3}{5}(5) + 3 \\ &= -3 + 3 = \boxed{0} \checkmark \end{aligned}$$

$$\begin{aligned} f(-5) &= \frac{-3}{5}(-5) + 3 \\ &= 3 + 3 = \boxed{6} \checkmark \end{aligned}$$

Graph $f(x)$ 

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

Find

$$1) (f+g)(x) = f(x) + g(x) = 2x - 5 + x + 10 \\ = \boxed{3x + 5}$$

$$2) (f-g)(x) = f(x) - g(x) = 2x - 5 - (x + 10) \\ = 2x - 5 - x - 10 \\ = \boxed{x - 15}$$

$$3) (f \cdot g)(x) = f(x) \cdot g(x) = (2x - 5)(x + 10) \\ = 2x^2 + 20x - 5x - 50 \\ = \boxed{2x^2 + 15x - 50}$$

$$4) (f/g)(x) = \frac{f(x)}{g(x)} \\ = \frac{2x - 5}{x + 10}; \quad x + 10 \neq 0$$

$$x \neq -10$$

Composition

$$= \boxed{\frac{2x - 5}{x + 10}; \quad x \neq -10}$$

$$5) (f \circ g)(x) = f(g(x)) \\ = 2(g(x)) - 5 = 2(x + 10) - 5 \\ = 2x + 20 - 5 \\ = \boxed{2x + 15}$$

$$f(x) = x^2 + 5 \quad g(x) = x - 5$$

Find

$$1) f(-2) = (-2)^2 + 5$$

$$= 4 + 5$$

$$= \boxed{9}$$

$$2) g(-5) = -5 - 5$$

$$= \boxed{-10}$$

$$3) (f+g)(x) = f(x) + g(x)$$

$$= x^2 + 5 + x - 5 = \boxed{x^2 + x}$$

$$4) (f-g)(x) = f(x) - g(x)$$

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

$$= x^2 + 5 - x + 5 = \boxed{x^2 - x + 10}$$

$$5) (f \cdot g)(x) = f(x) \cdot g(x)$$

Multiplication Product

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

$$= \boxed{x^3 - 5x^2 + 5x - 25}$$

$$6) (f/g)(x) = \frac{f(x)}{g(x)} ; g(x) \neq 0$$

Composition

$$= \frac{x^2 + 5}{x - 5} ; x - 5 \neq 0$$

$$\rightarrow \boxed{\frac{x^2 + 5}{x - 5} ; x \neq 5}$$

$$7) (f \circ g)(x) = f(g(x))$$

$$= (g(x))^2 + 5 = (x - 5)^2 + 5$$

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

$$= x^2 - 5x - 5x + 25 + 5$$

$$= \boxed{x^2 - 10x + 30}$$

$$f(x) = x^2 + 3x + 9 \quad g(x) = x - 3$$

1) $f(3) = (3)^2 + 3(3) + 9 = 9 + 9 + 9 = 27$

2) $g(3) = 3 - 3 = 0$

3) $(f + g)(x) = f(x) + g(x) = x^2 + 3x + 9 + x - 3 = x^2 + 4x + 6$

4) $(f - g)(x) = f(x) - g(x) = x^2 + 3x + 9 - (x - 3) = x^2 + 3x + 9 - x + 3 = x^2 + 2x + 12$

5) $(f \cdot g)(x) = f(x) \cdot g(x) = (x^2 + 3x + 9)(x - 3) = x^3 - 3x^2 + 3x^2 - 9x + 9x - 27 = x^3 - 27$

$x^2 \cdot x = x^3$
 $x \cdot x \cdot x = x^3$
 x^3

6) $(f/g)(x) = \frac{f(x)}{g(x)} ; g(x) \neq 0 \quad x - 3 \neq 0$
 $x \neq 3$

$$= \frac{x^2 + 3x + 9}{x - 3} ; x \neq 3$$

7) $(f \circ g)(x) = f(g(x)) = (g(x))^2 + 3(g(x)) + 9$

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

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

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

Solve & Graph

$$2(x-3) + 1 > 4(x+1) - 5$$

$$2x - 6 + 1 > 4x + 4 - 5$$

$$2x - 5 > 4x - 1$$

$$2x - 4x > -1 + 5$$

$$-2x > 4$$

Set-Builder notation

$$\{x \mid x < -2\}$$

Divide by -2

$$\frac{-2}{-2}x < \frac{4}{-2}$$

$$x < -2$$

Graphing



Interval notation

$$(-\infty, -2)$$

Solve & Graph

$$-7 < 3x + 2 \leq 20$$

Isolate x in the middle.

$$-7 - 2 < 3x + 2 - 2 \leq 20 - 2$$

$$-9 < 3x \leq 18$$

$$\frac{-9}{3} < \frac{3}{3}x \leq \frac{18}{3}$$

$$-3 < x \leq 6$$

Graphing

Such that $(-3, 6]$

Interval notation

$$\{x \mid -3 < x \leq 6\}$$

Set-Builder notation

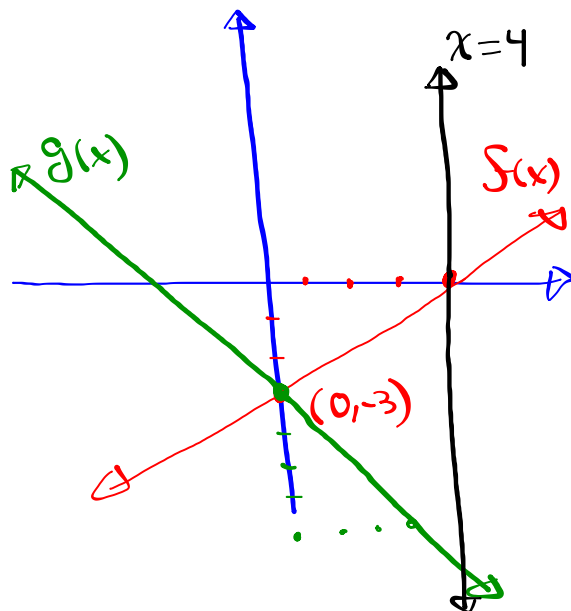
Graph

$$f(x) = \frac{3}{4}x - 3$$

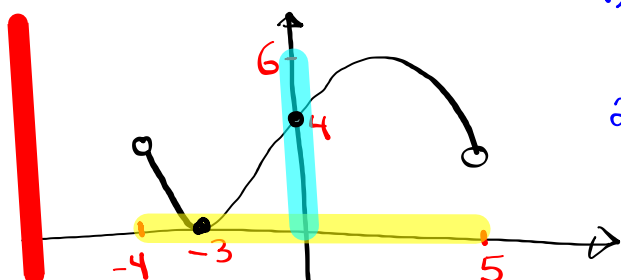
$$g(x) = -\frac{4}{3}x - 3$$

$$x = 4$$

Vertical line
(Not a function)



Consider the graph below:



1) Domain $-4 < x < 5$
 $(-4, 5)$

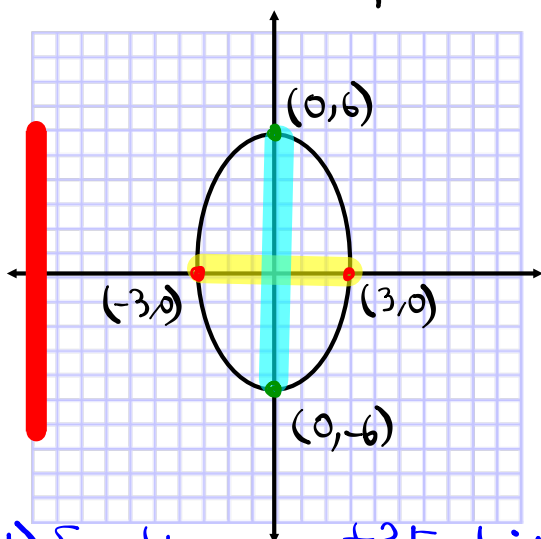
2) Range $0 \leq y \leq 6$
 $[0, 6]$

3) All intercepts
x-Int: $(-3, 0)$
y-Int: $(0, 4)$

4) Function or not? Explain

Yes, it is a function by V.L.T.

Consider the graph below:



1) Domain $-3 \leq x \leq 3$
 $[-3, 3]$

2) Range $-6 \leq y \leq 6$
 $[-6, 6]$

3) All intercepts

X-Ints: $(-3, 0), (3, 0)$

Y-Int: $(0, -6), (0, 6)$

4) Function or not? Explain

Not a function, it fails the V.L.T.

Reduce

$$1) \frac{15}{25} = \frac{\cancel{5} \cdot 3}{\cancel{5} \cdot 5} = \boxed{\frac{3}{5}}$$

$$2) \frac{x^3 y^2}{x y^5} = \frac{\cancel{x} \cancel{x} \cancel{x} \cancel{y} \cancel{y}}{\cancel{x} \cancel{y} \cancel{y} \cancel{y} \cancel{y}} = \frac{x x}{y y y} = \boxed{\frac{x^2}{y^3}}$$

$$3) \frac{x^2 + 10x}{x^2 - 7x} = \frac{\cancel{x}(x+10)}{\cancel{x}(x-7)} = \boxed{\frac{x+10}{x-7}}$$

$$4) \frac{x^2 + 8x + 15}{x^2 + 5x + 6} = \frac{\cancel{(x+3)}(x+5)}{\cancel{(x+3)}(x+2)} = \boxed{\frac{x+5}{x+2}}$$

Special Factoring:

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

$$4x^2 - 81 =$$

$$(2x)^2 - (9)^2 = (2x + 9)(2x - 9)$$

$$49x^2 - 100 =$$

$$(7x)^2 - (10)^2 = (7x + 10)(7x - 10)$$

Class QZ 8

1) Solve & graph

$$2x - 7 \leq -3x - 17$$

$$2x + 3x \leq -17 + 7$$

$$5x \leq -10$$

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

$$x \leq -2$$



2) $f(x) = 5x + 2$

$g(x) = 5x - 2$

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

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

$$= 25x^2 - 10x + 10x - 4 = 25x^2 - 4$$