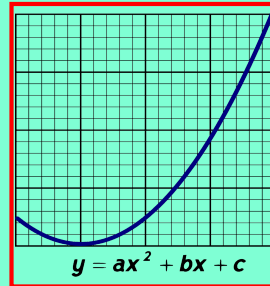


Math 125

Fall 2021

Lecture 8



Class QZ 6

1) Convert $3x - 5y = 20$ in Slope-Int Formthen express in Function notation.

$$-5y = -3x + 20$$

$$y = \frac{-3}{-5}x + \frac{20}{-5}$$

$$y = \frac{3}{5}x - 4$$

$$f(x) = \frac{3}{5}x - 4$$

$$2) f(x) = \frac{x-10}{x-1}$$

Find

a) $f(0)$

$$= \frac{0-10}{0-1} = \frac{-10}{-1} = \boxed{10} \checkmark$$

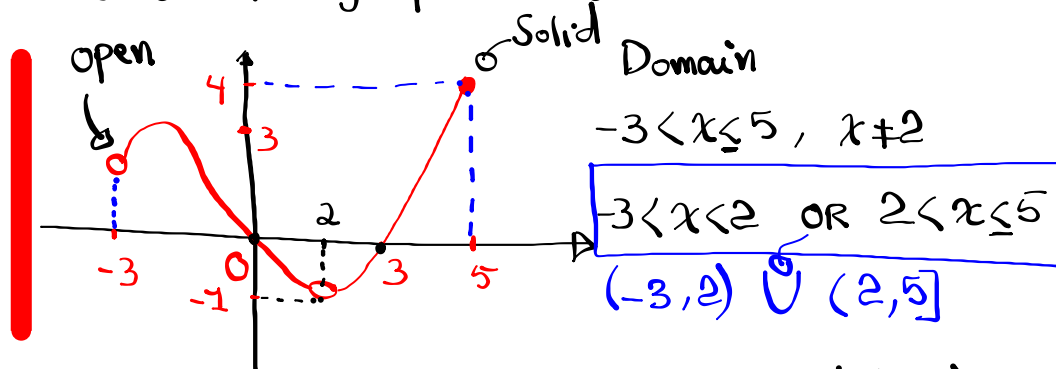
b) $f(10)$

$$= \frac{10-10}{10-1} = \frac{0}{9} = \boxed{0} \checkmark$$

c) $f(1)$

$$= \frac{1-10}{1-1} = \frac{-9}{0} = \boxed{\text{undefined}} \checkmark$$

Consider the graph below



Range: $-1 < y \leq 4$
 $(-1, 4]$

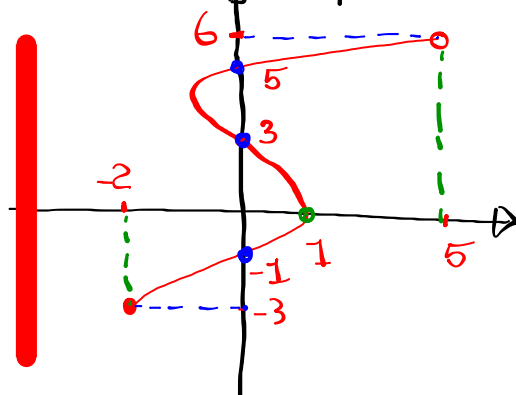
x-Ints: $(0, 0)$ & $(3, 0)$

y-Int: $(0, 0)$

Function by V.L.T.

Vertical line Test

Consider the graph below:



Domain: $-2 \leq x < 5$
 $[-2, 5)$

Range: $-3 \leq y < 6$
 $[-3, 6)$

Function or not? Explain

Not a Function, It
 Fails the V.L.T.

x-Ints:
 $(1, 0)$

y-Ints:
 $(0, -1), (0, 3)$
 $(0, 5)$

$$f(x) = x^2 - 4x - 6$$

Find

$$f(0) = 0^2 - 4(0) - 6$$

$$= 0 - 0 - 6$$

$$= -6$$

$$(0, -6)$$

$$f(2) = 2^2 - 4(2) - 6$$

$$= 4 - 8 - 6$$

$$= -10$$

$$(2, -10)$$

$$f(-2)$$

$$= (-2)^2 - 4(-2) - 6$$

$$= 4 + 8 - 6$$

$$= 6$$

$$(-2, 6)$$

$$f(2x) = (2x)^2 - 4(2x) - 6$$

$$= 4x^2 - 8x - 6$$

$$f(x+2) =$$

$$(x+2)^2 - 4(x+2) - 6$$

$$= (x+2)(x+2) - 4(x+2) - 6$$

$$= x^2 + \cancel{2x} + \cancel{2x} + 4 - \cancel{4x} - 8 - 6$$

$$= x^2 - 10$$

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

Find

$$f(0) = 0^2 + 3(0)$$

$$= 0 + 0$$

$$= 0$$

$$(0, 0)$$

$$f(3) = 3^2 + 3(3)$$

$$= 9 + 9$$

$$= 18$$

$$(3, 18)$$

$$f(-3)$$

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

$$= 9 - 9$$

$$= 0$$

$$(-3, 0)$$

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

$$= 9x^2 - 9x$$

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

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

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

$$= x^2 - 3x$$

Operations with Functions

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

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

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

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

5) Composition $(f \circ g)(x) = f(g(x))$

ex: $f(x) = x + 8$ $g(x) = x - 2$

$$(f + g)(x) = f(x) + g(x) \\ = x + 8 + x - 2 = \boxed{2x + 6}$$

$$(f - g)(x) = f(x) - g(x) \\ = x + 8 - (x - 2) = \cancel{x} + 8 - \cancel{x} + 2 \\ = \boxed{10}$$

$$(f \cdot g)(x) = f(x) \cdot g(x) = (x + 8)(x - 2) \\ = x^2 - 2x + 8x - 16 \\ = \boxed{x^2 + 6x - 16}$$

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

find

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

Monomial

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

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

Binomial

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

$$= 2x^2 - 10x + 5x - 25$$

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

Trinomial

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

$$2x \cdot (-5) = -10x \rightarrow -5x$$

$$x \cdot 5 = 5x$$

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

$$g(x) = x - 3$$

$$(f/g)(x) = \frac{f(x)}{g(x)} = \frac{2x - 5}{x - 3} \quad \begin{matrix} x - 3 \neq 0 \\ x \neq 3 \end{matrix}$$

$$= \boxed{\frac{2x - 5}{x - 3} ; x \neq 3}$$

$$(f \circ g)(x) = f(g(x)) = f(x - 3)$$

$$2 \underset{\nwarrow}{g(x)} - 5$$

$$= 2(x - 3) - 5$$

$$= 2x - 6 - 5 = \boxed{2x - 11}$$

$$f(x) = x + 8$$

$$g(x) = x + 5$$

Find

$$f(-8) = -8 + 8 = \boxed{0}$$

$$g(-5) = -5 + 5 = \boxed{0}$$

$$(f/g)(x) = \frac{f(x)}{g(x)} = \frac{x+8}{x+5} \quad \begin{matrix} x+5 \neq 0 \\ x \neq -5 \end{matrix}$$

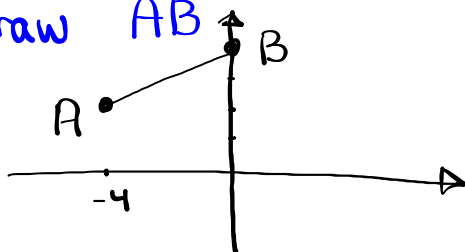
$$= \boxed{\frac{x+8}{x+5} ; x \neq -5}$$

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

$$= g(x) + 8 = x + 5 + 8 = \boxed{x + 13}$$

Given $A(-4, 2)$ $B(0, 4)$

Draw $\overline{AB}$



Find midpoint M

$$M\left(\frac{-4+0}{2}, \frac{2+4}{2}\right) = M(-2, 3)$$

Find slope m

$$m = \frac{2-4}{-4-0} = \frac{-2}{-4} = \boxed{\frac{1}{2}}$$

Find $d(A, B)$

$$d = \sqrt{(-4-0)^2 + (2-4)^2}$$

$$= \sqrt{(-4)^2 + (-2)^2} = \sqrt{16+4} = \sqrt{20}$$

$$\boxed{d \approx 4.472}$$

Solve & graph

$$-5 < -2x + 1 \leq 9$$

we must isolate
 x in the middle



$$[-4, 3)$$

Subtract 1

$$-5-1 < -2x + \cancel{1} - \cancel{1} \leq 9-1$$

$$-6 < -2x \leq 8$$

Divide by -2

$$\frac{-6}{-2} > \frac{-2}{-2}x \geq \frac{8}{-2}$$

$$3 > x \geq -4$$

$$-4 \leq x < 3$$

Class QZ 7

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

Find

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

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

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

Graph $f(x)$ 