

3.2 Introduction to Functions

relation - set of ordered pairs

function - relation in which no two ordered pairs have the same first coordinates but different second coordinates

x is the independent variable
(we can choose values to plug in)

y is the dependent variable
(y values are dependent on the x values we plug in)

$\Rightarrow y$ is a function of x

functional notation: $y = f(x)$

NOT ~~f "times" x~~ " f of x "



Evaluating a Function

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

$$(x, y)$$

$$(x, f(x))$$

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

$$f(-3) = 3(-3)^2 - 2(-3) = \boxed{33} \quad (-3, 33)$$

$$-9 \neq 3^2 \neq (-3)^2 = 9$$

Domain & Range

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

Domain: the set of

$$x \neq 0$$

real numbers for which
the function value is
a real number

(the set of numbers that
"make sense" when you
plug them into the function)

~~$$\frac{1}{0}$$~~

~~$$\sqrt{-5}$$~~

* exclude values of variable
that give us 0 in the denominator
& negative values under a radical

What values are not in the domain?

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

$$f(x) = \frac{x+3}{x-7}, \quad x \neq 7$$

$$f(x) = \frac{2x^2}{(x-1)(x+5)}, \quad x \neq 1, -5$$

State the domain of the function.

$$f(x) = \sqrt{x} \quad \{x \mid x \geq 0\} = [0, \infty)$$

$$f(x) = \sqrt{x+2} \quad \{x \mid x+2 \geq 0\} = \{x \mid x \geq -2\} \\ [-2, \infty)$$

$$f(x) = \sqrt{5-x} \quad \{x \mid 5-x \geq 0\} = (-\infty, 5] \\ \{x \mid \overset{5 \geq x}{x \leq 5}\}$$

$$f(x) = \frac{x+2}{\sqrt{x-1}} \quad x-1 > 0 \\ \{x \mid x > 1\} = (1, \infty)$$

Range : output of the domain

$$\{(1,2), (3,4), (5,6), (7,8)\}$$

domain: $\{1, 3, 5, 7\}$ (x-coord's)

range: $\{2, 4, 6, 8\}$ (y-coord's)

$$f(x) = \frac{3x-2}{x+4}$$

$$f(-1) = \frac{3(-1)-2}{-1+4} = -\frac{5}{3}$$

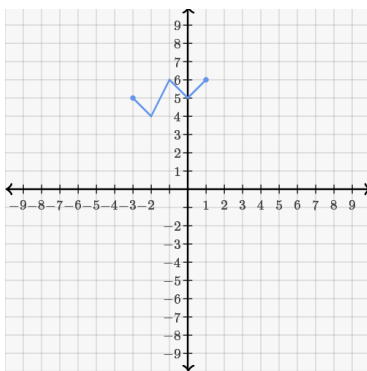
$$f(-2) = \frac{3(-2)-2}{-2+4} = -\frac{8}{2} = -4$$

domain: $\{-1, -2, 1\}$

range: $\{-\frac{5}{3}, -4, \frac{1}{5}\}$

$$f(1) = \frac{3(1)-2}{1+4} = \frac{1}{5}$$

State the domain and range of the function graphed in blue.



Domain:

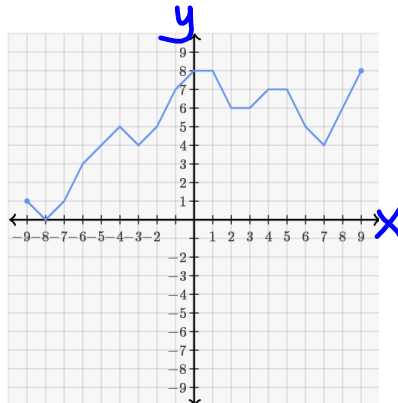
$$[-3, 1]$$

$$-3 \leq x \leq 1$$

Range:

$$[4, 6]$$

$$4 \leq f(x) \leq 6$$

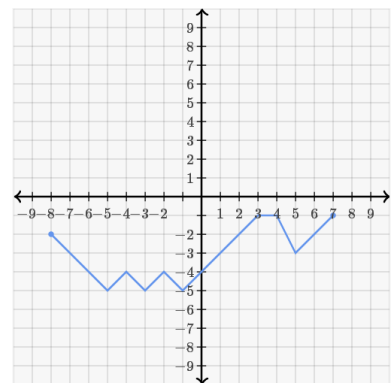


Domain:

$$[-9, 9]$$

Range:

$$[0, 8]$$



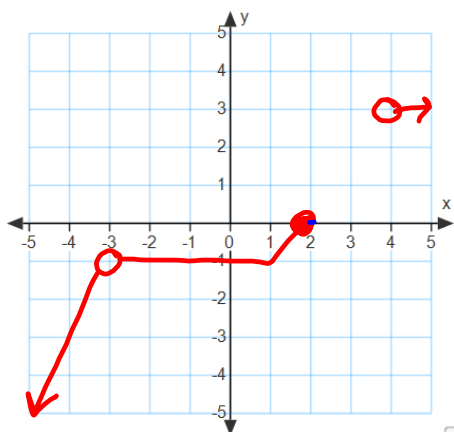
Domain:

$$[-8, 7]$$

Range:

$$[-5, -1]$$

State the domain and range of the function.

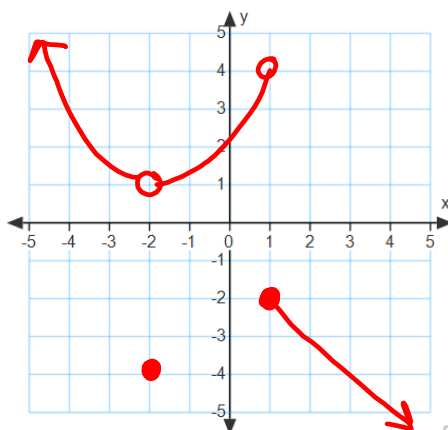


Domain:

$$(-\infty, -3) \cup (-3, 2] \cup (4, \infty)$$

Range:

$$(-\infty, 0] \cup \{3\}$$



Domain:

$$(-\infty, \infty) = \mathbb{R}$$

Range:

$$(-\infty, -2] \cup (1, \infty)$$

Recommended textbook problems on functions, domain and range:
3.2 #3-16, 21-44, 49-88

Quiz Wednesday on:

- midpoint, distance, slope, equation of a line
- functions, domain, range

Homework grade will be assigned on Friday based on problems **practiced** from Ch 3.