

Function Notation

Youtube: "Using Function Notation - What is f(x)?"

Because functions are used throughout mathematics,

by mroldridge

Function Notation

was developed to make it easier to work with them. Function notation can be used even when we do not know the details of a particular relationship.

Suppose a function is given. Let f denote a given function and let x represent the input value.

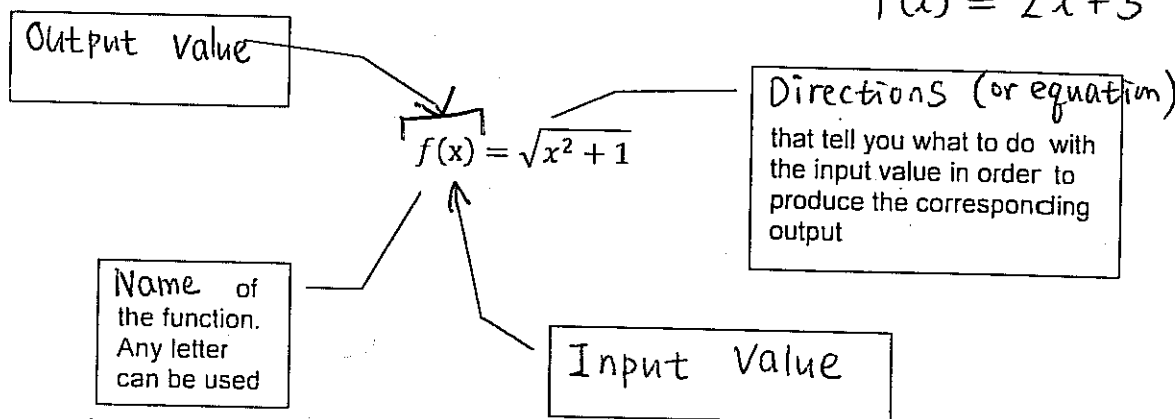
$f(x)$ denotes the value (output) of the function when the input is x . In other words, $f(x) = y$.

$$y = 2x + 3$$



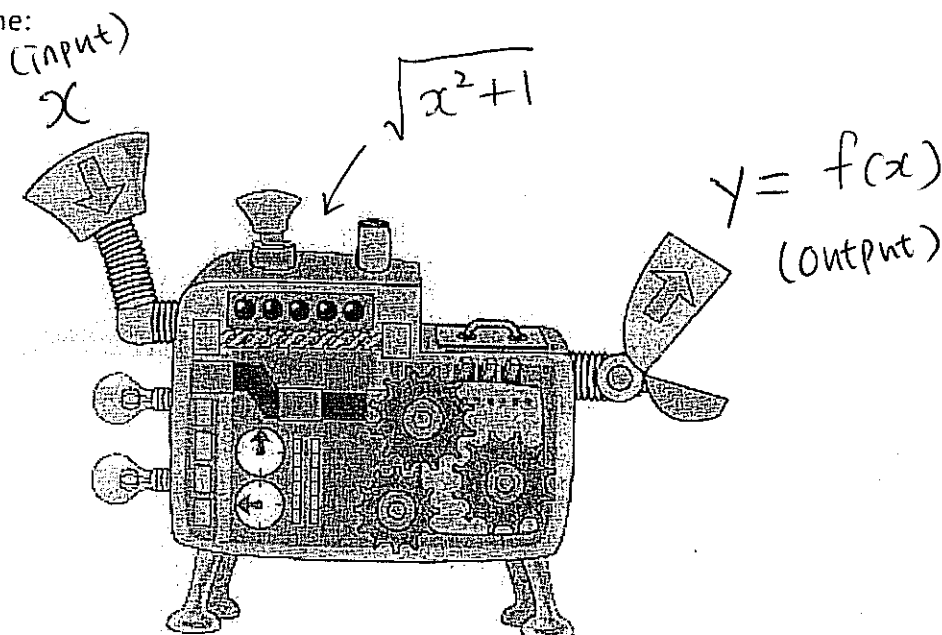
$$f(x) = 2x + 3$$

Usually a function is represented by a mathematical expression.



* Don't confuse $f(x)$ with multiplication! The entire symbol $f(x)$ represents a function, its input, and its output. It is not the same as an algebraic expression.

The Function Machine:



Evaluating Functions

Example 1 If $f(x) = 2x + 3$, find

a) $f(6) =$ when $x=6$, $y=?$

$$f(6) = 2 \cdot (6) + 3$$

$$f(6) = 12 + 3 = 15$$

$$\therefore f(6) = 15 \rightarrow (6, 15)$$

c) $f(x+1)$

$$f(x+1) = 2(x+1) + 3$$

$$= 2x + 2 + 3$$

$$= 2x + 5$$

$$\therefore f(x+1) = 2x + 5 \rightarrow (x+1, 2x+5) \quad \therefore f(2x) = 4x + 3$$

b) $f(-5) =$ when $x = -5$, $y = ?$

$$f(-5) = 2(-5) + 3$$

$$= -7$$

$$\therefore f(-5) = -7$$

d) $f(2x)$

$$f(2x) = 2 \cdot (2x) + 3$$

$$= 4x + 3$$

Example 2

Given the graph to the right, find

a) $f(2) \Rightarrow$ when $x=2$, $y=?$

$$f(2) = -2$$

b) $f(-3) \rightarrow$ when $x=-3$, $y=?$

$$f(-3) = 4$$

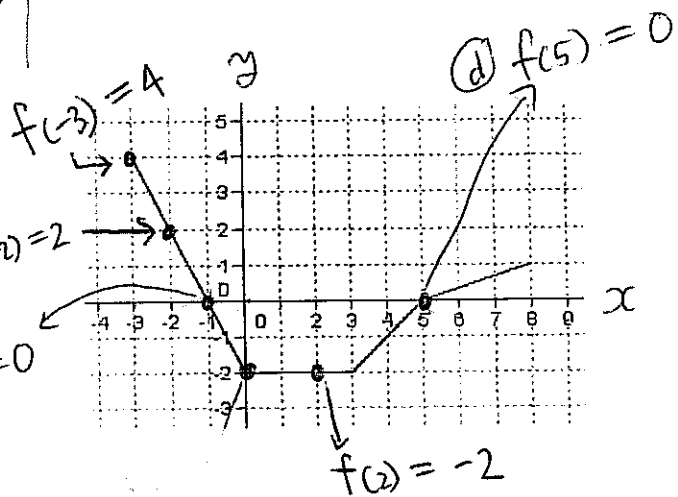
c) x if $f(x) = 2 \rightarrow y=2$, $x=?$

$$x = -2 \quad f(-2) = 2$$

d) x if $f(x) = 0 \rightarrow$ when $y=0$, $x=?$

$$x = -1 \text{ or } 5$$

$$\therefore f(-1) = 0, \quad f(5) = 0$$



Application

A company rents cars for \$50 per day plus \$0.15/km.

- a) Express the daily rental cost, C as a function of the number of kilometres, d travelled.

$$C(d) = 0.15d + 50$$



- b) Determine the rental cost if you drive 472 km in one day.

$$C(d) = (0.15 \times 472 \text{ km}) + 50$$

$$C(d) = 70.8 + 50 = 120.80$$

$$C(472) = 120.80$$

∴ Rental cost is \$120.80

- c) Determine how far you can drive in a day for \$80.

$$C(d) = 80 \quad d = ?$$

$$80 = 0.15d + 50$$

$$80 - 50 = 0.15d$$

$$\frac{30}{0.15} = \frac{0.15d}{0.15}$$

$$200 = d$$

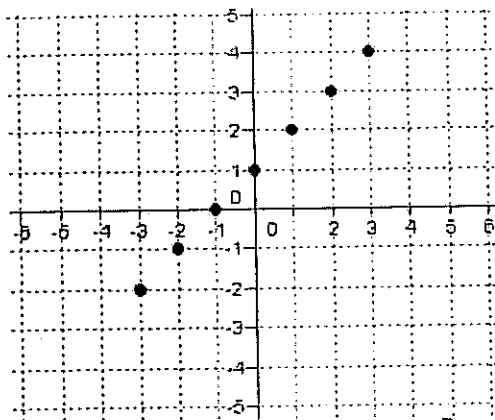
- d) Is $C(d)$ a function? Justify your answer.

Yes any linear equation (function notation) is a function.

* Announcement: Quiz will occur on Wed! (small quiz on radicals, which was Wed lesson and Thurs lesson of last week)

1. State the domain and range.

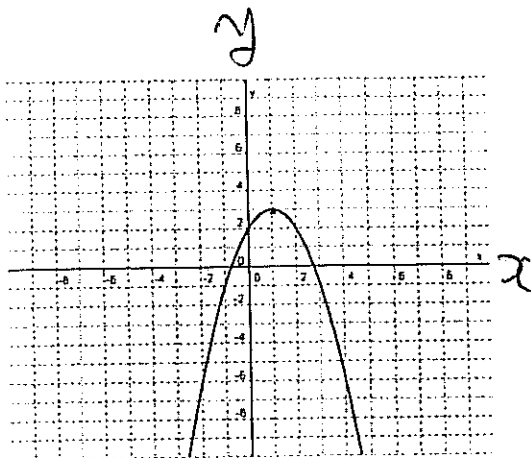
a)



$$D = \{-3, -2, -1, 0, 1, 2, 3\}$$

$$R = \{-2, -1, 0, 1, 2, 3, 4\}$$

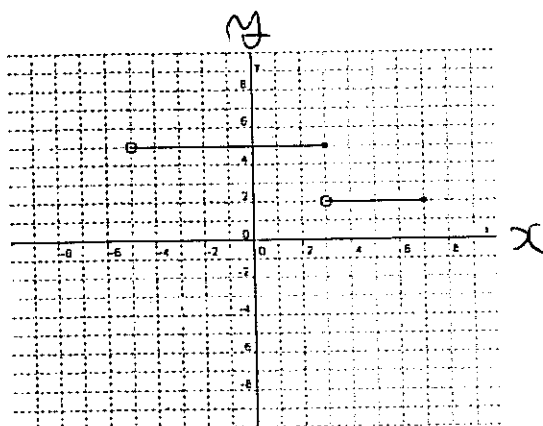
b)



$$D = \{x \in \mathbb{R}\}$$

$$R = \{y \in \mathbb{R}, y \leq 3\}$$

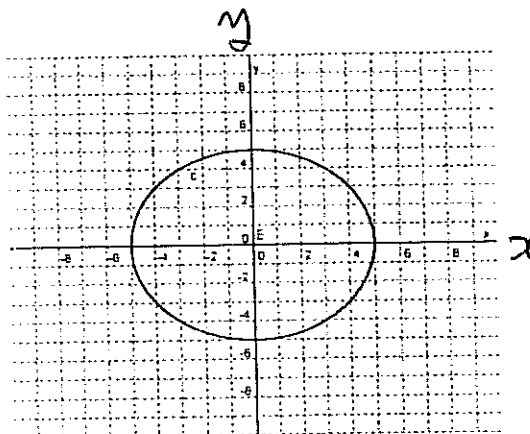
c)



$$D = \{x \in \mathbb{R}, -5 < x \leq 7\}$$

$$R = \{2, 5\}$$

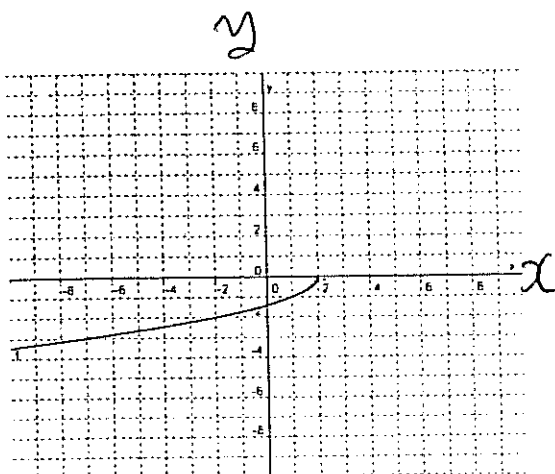
d)



$$D = \{x \in \mathbb{R}, -5 \leq x \leq 5\}$$

$$R = \{y \in \mathbb{R}, -5 \leq y \leq 5\}$$

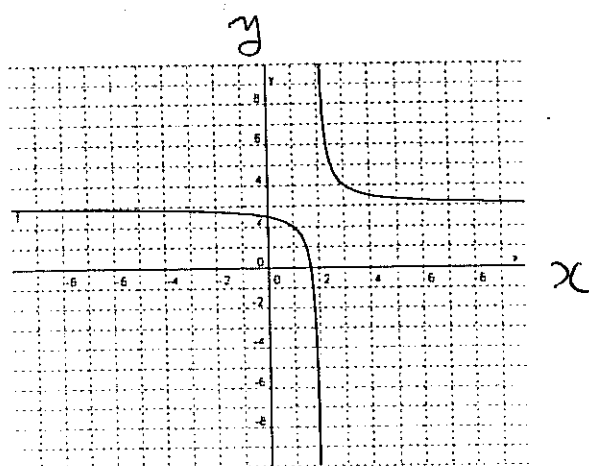
e)



$$D = \{x \in \mathbb{R}, x \leq 2\}$$

$$R = \{y \in \mathbb{R}, y \leq 0\}$$

f)



$$D = \{x \in \mathbb{R}, x \neq 2\}$$

$$R = \{y \in \mathbb{R}, y \neq 3\}$$