

Expressions, Equations, and Functions

Learning objectives: expressions, equations, overview of functions, domain and range, vertical line test

What is an Expression?

Expression - a "sentence" with at least **two terms** and a **math operator**.

- A term is a number or a number multiplied by a variable
- What is an operator? Operators are all the common math signs you know, like: +, -, x

Which of the following are not expressions*:

a) $2 + 7$

c) 23.5

b) $2x - 3$

d) $25 - 1/2$

An **algebraic** expression contains variables, while an **Arithmetic** expression does not.

What is an Equation?

Equations are very similar to expressions, but the key difference is that:

an Equation sets an expression or term equal to another expression or term using the equal sign



$$\underbrace{2x - 3}_{\text{expression}} = \underbrace{5}_{\text{term}}$$

More examples:

a) $3x + 4 = 5$

c) $23 + 4 = c$

b) $9 - 22 = -13$

d) $x + y = z$

What is a Function?

Function - a relation between a set of inputs

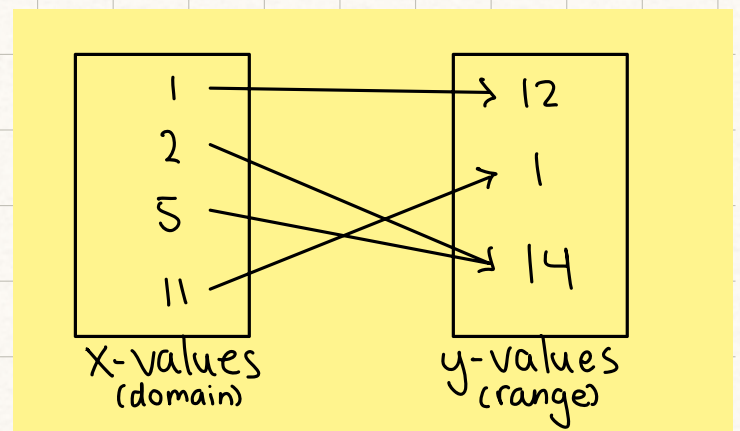
having one output each

- All functions have a **domain** and **range**

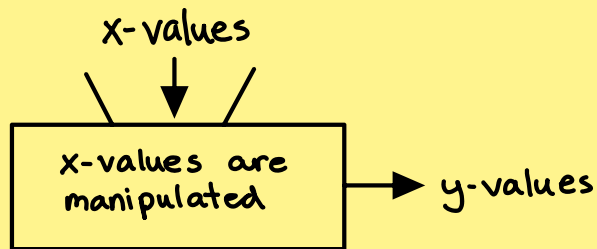
- Domain: input (x-values)

- Range: output (y-values)

- A function is usually denoted as $f(x)$ read as "f of x" where x is the input and $f(x)$ is the output.



The Function Machine



- x-values go in, are manipulated, and come out as y-values

examples of functions:

a) $y = x$

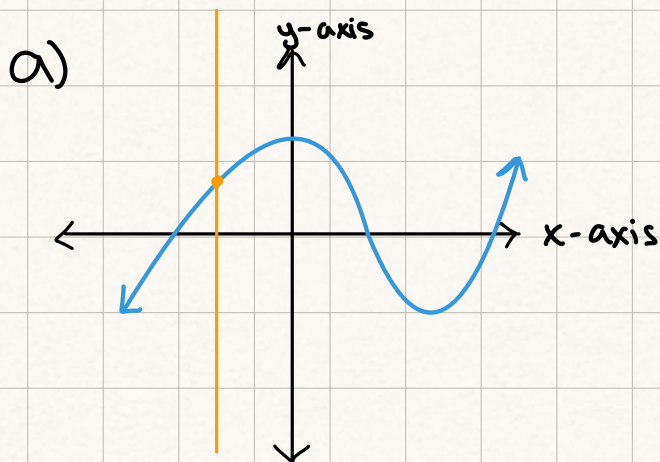
b) $y = 6x + 9$

c) $f(x) = 4x + 4$

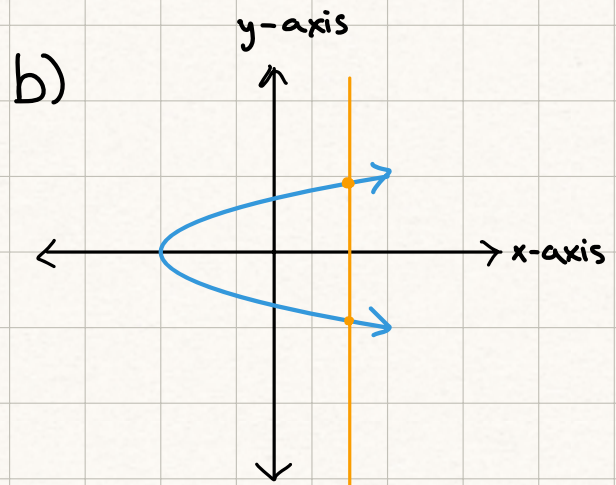
d) $y = x^2 - 2x + 1$ *parabola*

Vertical Line Test - a way to visually determine if a graph is a function by adding a vertical line through the graph.

- In a function, each x-value should have only ONE y-value
- If the vertical line crosses a graph more than once at any time, it is not a function



Is a function ✓



Not a function ✗

*the answer is C because it does not have a math operator