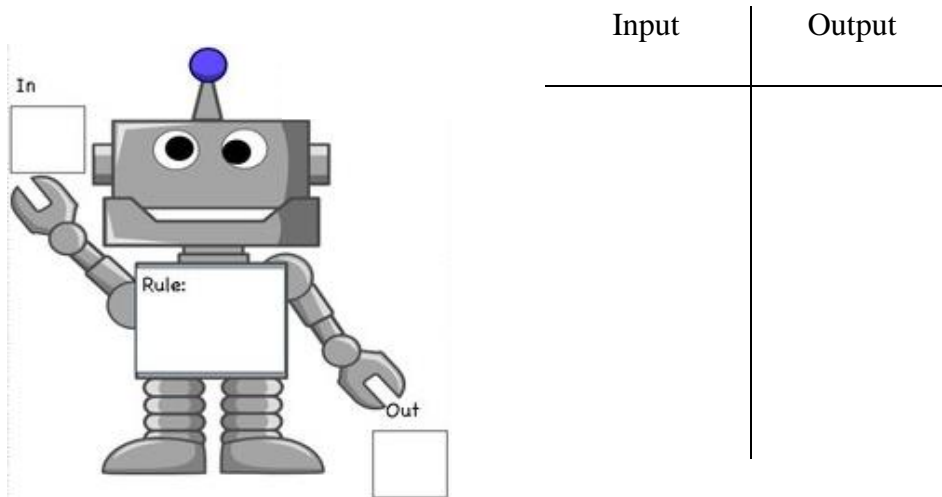# Introduction to Functions

**The Function Machine**

I have a magic machine that accepts any number, multiplies it by 2, adds 3 to this product, then outputs the result.

|  Input  |  Output  |
| --- | --- |
|  |  |

For each input, how many outputs does this machine put out?

In mathematics, we call a rule that outputs **only one output for each input** a **function.**

If we call our function *f,* we can write the function as _____

We read this as *"f* of *x* equals $2x$ plus 3."

**Warning!** Here the ( ) means *function of* whatever number is inside, not multiplication!

The *x* is a dummy variable that stands for "whatever number I decide to put in the function machine".
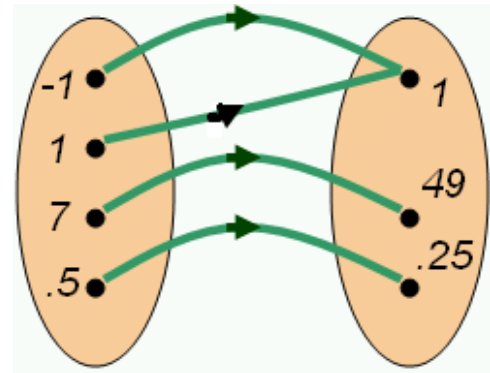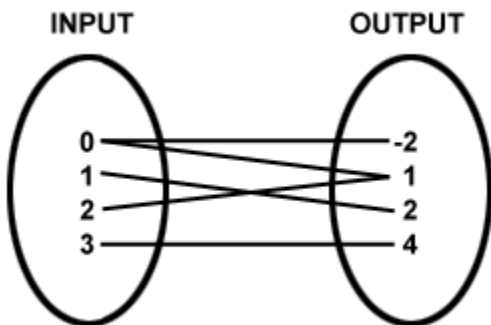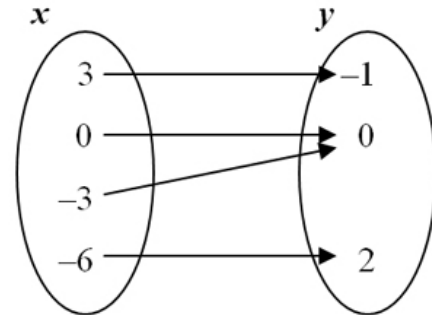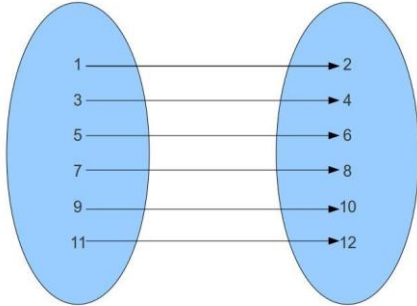
**Function Maps**

Another way to model functions is to draw a map between the inputs and outputs.

As long as the map follows the condition that every input only has one output, that map represents a function.
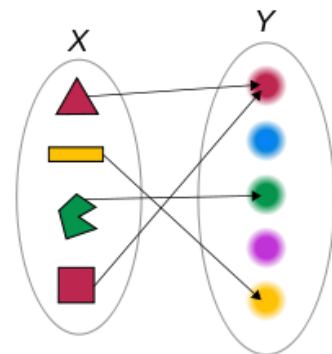
Determine whether each map below represents a function. If possible, find the rule that governs the function and express it in algebraic form.









State whether each of the following situations describes a function (there is only one output for each input).

1. Input: Name of a month. Output: Number of days in that month in the year 2019.

2. Input: A positive integer. Output: Name of a month with a number of days equal to the input.

3. Input: A positive integer. Output: A perfect square that is less than the input.

4. Input: An integer. Output: The largest perfect square that is less than the input.

**Evaluating Functions**

Given a specific function, I can ask you to find the output of a specific input by putting the input in the position of the dummy variable, $x$.

**Ex:** Given the function $f(x) = 2x + 5$, find $f(1), f(-3)$ and $f(0.5)$.

**Ex 2:** Consider the function $f(x) = 2x^2 - 5$.

a) Find $f(1), f(5)$, and $f(-3)$.

b) Will every real value of $x$ produce a value for $f(x)$?

c) Is there a real value of $x$ such that $f(x) = 3$?

d) What about $f(x) = -10$?

The **domain** of a function consists of all of the values that we are able to input into a function and get an output.

The **range** of a function consists of all of the values we can possibly output from the function.