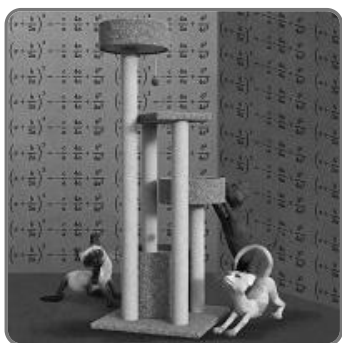


# INTRODUCTION TO FUNCTION NOTATION

- Want some basic practice with functions first?

## Introduction to Functions



([more mathematical cats](#)).

A **function** is a rule that takes an input, does something to it, and gives a unique corresponding output.

There is a special notation (called ‘function notation’) that is used to represent this situation:

if the function name is  $f$ ,  
and the input name is  $x$ ,  
then the unique corresponding output is called  $f(x)$ .

The notation ‘ $f(x)$ ’ is read aloud as: ‘ $f$  of  $x$ ’.

So, what exactly **is**  $f(x)$ ?

Answer: It is the output from the function  $f$  when the input is  $x$ .

As a second example, what exactly **is**  $g(t)$ ?

Answer: It is the output from the function  $g$  when the input is  $t$ .

Note that  $f$  and  $f(x)$  are **different**:

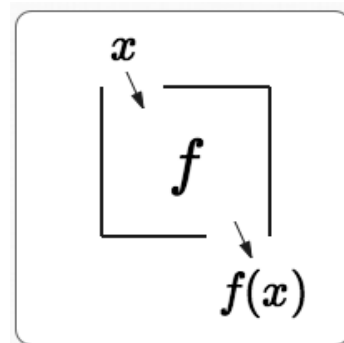
$f$  is the name of the function (the ‘rule’);

$f(x)$  is the **output** from this rule when the input is  $x$ .

It is often helpful to think of a function as a ‘box’.

You drop an input in the top, something happens to the input inside the box, and the output drops out the bottom.

The box is labeled with the name of the function.



a function box

input:  $x$

name of function:  $f$

output:  $f(x)$

The letter  $f$  is commonly used as the name of a function, since it is the first letter in the word function.

If  $x$  is dropped in the top of the box labeled  $f$ , then  $f(x)$  comes out the bottom.

If  $t$  is dropped in the top of the box labeled  $g$ , then  $g(t)$  comes out the bottom.

If  $x + 2t$  is dropped in the top of the box labeled  $h$ , then  $h(x + 2t)$  (read as ‘ $h$  of  $x + 2t$ ’) comes out the bottom.

The equation ‘ $f(x) = x + 2$ ’ is function notation that describes the following situation:  
a function named  $f$  acts on an input (here, indicated by  $x$ ), and gives the output  $f(x)$ ,  
which is equal to  $x + 2$ .

Thus, ‘ $f(x) = x + 2$ ’ describes the ‘add 2’ function.

This same function  $f$  could also be described by any of these:

$$f(t) = t + 2$$

$$f(w) = w + 2$$

$$f(u) = u + 2$$

The variable used locally to give a name to the input is called a *dummy variable*.

In the equation  $f(t) = t + 2$ , the dummy variable is  $t$ .

In the equation  $f(w) = w + 2$ , the dummy variable is  $w$ .

In the equation  $f(u) = u + 2$ , the dummy variable is  $u$ .

#### EXAMPLES:

**Question:** What does the function notation  $g(7)$  represent?

**Answer:** the output from the function  $g$  when the input is 7

**Question:** Suppose  $f(x) = x + 2$ . What is  $f(3)$ ?

**Answer:**  $f(3) = 3 + 2 = 5$

**Question:** Suppose  $f(x) = x + 2$ . What is  $f(x + 5)$ ?

**Answer:**  $f(x + 5) = (x + 5) + 2 = x + 7$

**Question:** Suppose  $g(x) = 3x + 2$ . Describe, in words, what the function  $g$  does.

**Answer:** the function  $g$  takes an input, multiplies by 3, and then adds 2

**Question:** Write function notation for the 'multiply by 5' rule.

Use  $f$  as the name of the function, and  $t$  as the name for the input.

**Answer:**  $f(t) = 5t$

**Question:** Write the function rule  $f(x) = 5x - 2$  using the dummy variable  $t$ .

**Answer:**  $f(t) = 5t - 2$