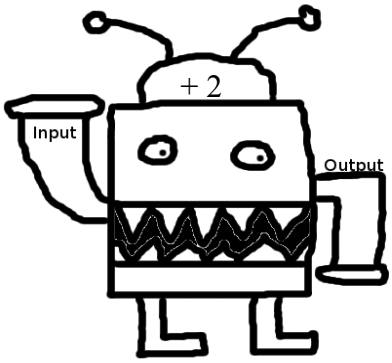
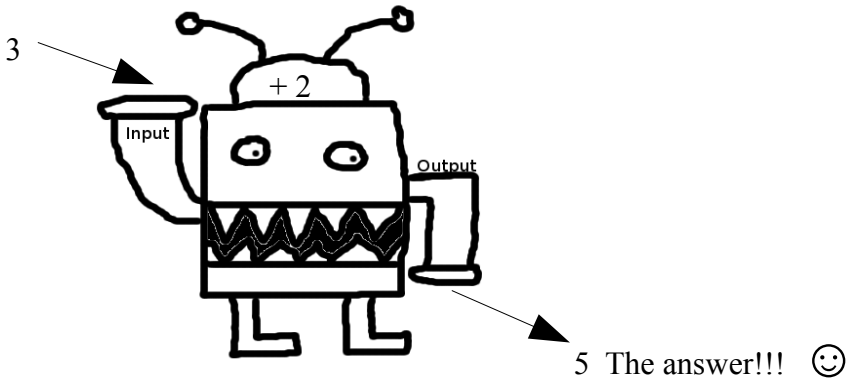
OK, I'm going to try and do this the way I always teach this...with bad drawings! Hurray!

Functions

A function is like a machine that does a task. Let's say that we want to add 2 to any number. What do you do? Build an "add two" robot of course!



Now that we have a machine that does this for us, we can give it numbers. Let's give it the number 3 to chew on!



So, if I feed (input) the "add two" machine a 3, it will spit out a 5 as the answer (or output).

Now, I love drawing robots as much as the next guy, but it's tiring business! Mathematicians are lazy and want to do as little work as possible to get our answers! In math we make our "add two" machines like this:

$$\mathbf{f(}x\mathbf{) = }x\mathbf{ + 2}$$

This means that our machine takes (or inputs) any number (x) and adds two to it. f(x) is the result (or output). We can try to put in several numbers:

This is the number we put into the function (x)

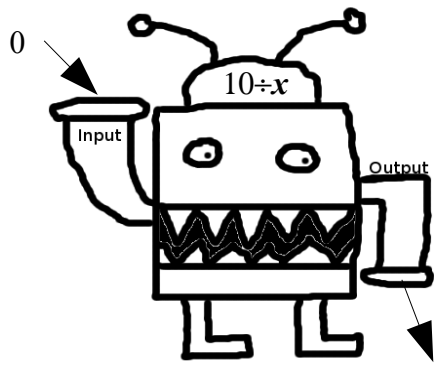
f(3) = 3 + 2 → f(3) = 5
f(2) = 2 + 2 → f(2) = 4
f(1) = 1 + 2 → f(1) = 3

This last one ***(f(1) = 3)*** can almost be read like: "the function, when using the number 1, gives 3 as the answer"

Domain

The domain of a function is the values you can use **to put into** the machine (or function). For instance, if I make a ten divided by x machine, there are certain values that won't work!

Robot Version



OH NOOOO!!!!!!
I CANNOT DO IT!!!!!!
*****EXPLOSION!!!*****

Mathematics Version

$f(x) = 10 \div x$
$f(0) = 10 \div 0 =$ Error (Undefined)

We know that we can't divide by zero, so it isn't part of the domain of this function. Sometimes we will limit the numbers we use for input for no real reason. I could, for instance, just randomly say the domain is any even number. Then I could only give my function even numbers. Or the domain could be the ages of students that I have taught. In this case the domain would be any number between 11 and 18.

Range

The range is the opposite of the domain. A range is the allowed numbers you can get as the **answer** to a function. If I had a times two function, then I would only get even numbers as my answers...therefore my range would be all even numbers!

$f(x) = 2 \bullet x$
$f(1) = 2 \bullet 1 = 2$
$f(2) = 2 \bullet 2 = 4$
$f(3) = 2 \bullet 3 = 6$

All of my answers are even numbers, so my range is all even numbers!

Here is a more complex example:

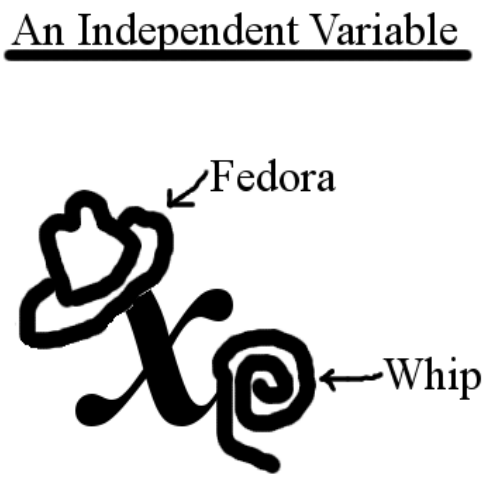
$f(x) = 6 \div x$ Domain: {1, 2, 3}

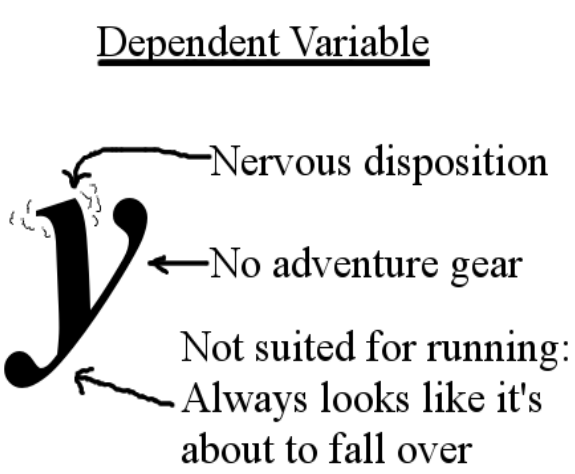
In this case, I can only input the numbers 1, 2, or 3. So let's get our range by putting these numbers into our function:

$f(1) = 6 \div 1$	$f(1) = 6$
$f(2) = 6 \div 2$	$f(2) = 3$
$f(3) = 6 \div 3$	$f(3) = 2$

My only possible answers are therefore 6, 3, and 2. This is also known as my range. So the range is: {2, 3, 6}

Independent & Dependent Variables





Independent Variable

- Never likes to visit the same place twice: Every input value has a unique output value (no repeating!)

Dependent Variable

- Doesn't mind visiting the same place more than once. More than one input may give the same answer!

Examples:

$f(x) = x + 1$

$f(1) = 1 + 1 = 2$
$f(2) = 2 + 1 = 3$ → always different answers
$f(3) = 3 + 1 = 4$

$f(x) = 3$

$f(1) = 3$
$f(2) = 3$ → the same number as the answer!
$f(3) = 3$

$f(x) = x \bullet 2$

$f(1) = 1 \bullet 2 = 2$
$f(2) = 2 \bullet 2 = 4$ → always different answers
$f(3) = 3 \bullet 2 = 6$

$f(x) = x^2$

$f(2) = 2^2 = 4$
$f(3) = 3^2 = 9$ → the number 9 occurs twice!
$f(-3) = (-3)^2 = 9$

There. I hope that helps a little. Let me know if you need help with anything else!

Kind regards,
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