

# Module 1 (of 6)

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## Week 1: What is Functions

— What are functions and where do we use it?

It's a relationship between some inputs and an output.

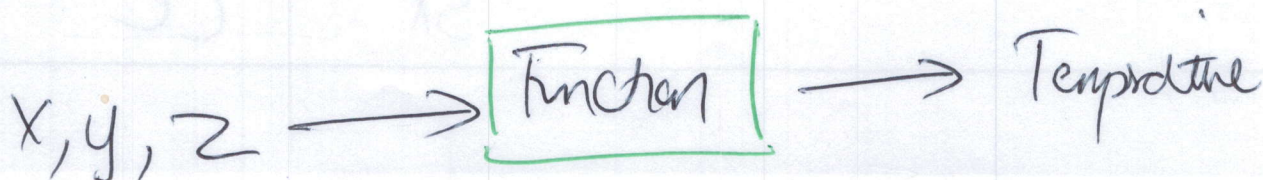
Eg I have function for distributing the temperature in the room.

— I may input  $x, y, z$  coordinate of a specific location of room

as well as time  $t$

— and function will output or return

the TEMPERATURE at that specific point in space at that moment in time.





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here So many areas of maths, the  
idea is very straightforward,  
But the notation can make things  
very confusing

Here is where a lot of the problems  
seem to arise.

In order to use and play with the  
interesting applications of maths, it  
requires you to do a lot of logic  
and sometimes boring groundwork  
∴ mathematical language.

But mathematical language is  
just like ~~other~~ learning other language  
in that respect, i.e. Can't enjoy French  
poetry, unless you have done a lot  
of learnt a lot of French vocabulary  
and grammar, quite



Understandable Some people find  
this off putting. 😞

But there is maths poetry waiting for  
those who persevere at end of the tunnel.

Machine learning is a whole new genre  
of this "poetry"

So we need to hang in there!

Let's go:

we have an expression:

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

~~From~~ <sup>Based</sup> on the above, one just has to know the  
 $f(x)$ , means  $f$  is a function of  $x$ ,  
and not  $f$  multiplied by  $x$ .....



(7)

This can get confusing, when:

$$f(x) = g(x) + h(x+a)$$

we can assume that ~~f~~,  $g, h$  are NOT variables.  
otherwise  $f(x, g, h, a)$

we need more explanation and more context.

i.e  $\hookrightarrow$   $g$  a function applied to  $x$ ?  
is  $h$  something similar?

Now: we will be shown some data, and will need to select a function to represent the data

— not intended to be difficult

— But selecting a function is the

Creative essence of Science

Process of selecting a candidate  
Function or hypothesis to  
model world is what great geniuses  
of Science are remembered for.



Then there's a long process of testing  
this hypothesis  
— But there will be nothing to test  
without that first creative step.

Calculus is simply the study of how these  
functions change w.r.t. to their input variables  
and allows you to investigate and manipulate  
them.

⇒ But ultimately it's just a set of tools

End of Course, use it myself to  
Model real world data.