Functional Notation

The father of Calculus (and Physics), Issac Newton, not only developed the concepts of Calculus, he created the language for Calculus that we still use more than 300 years after his death.

In math, "language" is called "**notation**."

Newtonian functional notation goes like this:

Instead of two separate variables, each function has a name (denoted by a letter). For example, f, for "function."

$$f(x)$$

Note the x! That's there for two reasons! First, it let's us know what the **INDEPENDENT VARIABLE** is.

It also provides a place to plug in values (inputs) to the function.

So for the function

$$f(x) = 1 - x^2$$

If we want to let ***x* = *3***, and plug it in to the function, we go

$$\begin{aligned} f(3) &= 1 - (3)^2 \\ &= 1 - 9 \\ &= -8 \end{aligned}$$

This is an efficient way of connecting outputs to inputs,

because we no longer need to say "let $x =$ ____"

Note that I used the **parenthesis** when I calculated the output value.

This is important!

$$f(3) = 1 - (3)^2$$

Here's **why** it's important!

Suppose I want to put $\boldsymbol{x = -3}$ into the function.

Here's what **could** happen:

canceling the minus signs

$$\begin{aligned} f(-3) &= 1 - -3^2 \\ &= 1 + 3^2 \\ &= 1 + 9 \\ &= 10 \end{aligned}$$

And that answer would be . . . . . wrong!

Now check out what happens when I use parenthesis:

$$f(-3) = 1 - (-3)^2$$

$$= 1 - 9$$

$$= -8$$

the exponent gets to the -3 before the subtract

This is the **right** answer!

In short, the parenthesis helps us to **deal correctly** with negative numbers!