

Formulas

What is this course about?

PreCalculus is about mathematical things called “functions.” Functions are like formulas, and Calculus, the next course, involves working with functions. So understanding them, and being able to use them, is necessary for doing well in Calculus!

Here’s an example of a **function**:

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

This function is one that I just made up. It doesn’t necessarily “mean anything” in the real world. However, many things in the real world can be described by functions.

Before we get to functions, let’s talk about formulas. Consider the following situation:

Jeremy has a job offer for a sales position selling furniture. He will be paid \$400 per week base salary. In addition, he will be paid 5% of the price of the furniture he has sold (this is called a commission). What is the total weekly amount Jeremy will be paid?

Let x = total price value of furniture sold

Let S = total salary for the week

Then,

$$S = 400 + 0.05x$$

This formula could be used to determine his salary, depending on the total value of his sales that week. For example, suppose Jeremy sold four bed sets, totaling in price value, \$3200. Then his salary would be

$$\begin{aligned} S &= 400 + 0.05(3200) \\ &= 400 + 160 \\ &= 560 \end{aligned}$$

His total pay for the week would be \$560.

That was a very specific applied example!

Now . . . we are heading into part of the course that is not very “real-life.”

Functions have a **theoretical** side!

This aspect of the course involves more abstract . . . **concepts**.

Don't worry, you can understand this!

There are many different kinds of mathematical formulas. In your previous math classes, these formulas were often understood as “equations”. For an equation to be a formula, there must be at least two variables.

For example, here are some equations in one variable:

$$x^2 + 6x + 8 = 0$$

$$2y - 6 = 8$$

$$\frac{4}{x} = \frac{1}{8}$$

These equations can all be “solved”. That means that you can figure out what the variable in the equation must be equal to for the statement to be true.

The solution to the middle equation is?

$$y = 7$$

But these equations are **not** formulas!

Whereas here are some equations in **two** variables:

$$(1) \quad y = \frac{1}{2}x - 6$$

$$(2) \quad h = -16t^2 + 32t - 16$$

$$(3) \quad F = \frac{9}{5}C + 32$$

These equations can be seen as **formulas**. Putting in a number for one variable produces a different number for the other variable.

Equations (1) and (3) have a form that you have seen before in previous classes. This is an important type of equation, and it will be the first time of function that we will explore. We will use this type of equation to introduce the concept of **functions**.