

Lecture 0.2: Functions

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December 2, 2022

This lecture is all about a review of functions.

1 Functions

The first big point he's making is that in order for something to be a function, each input X needs to be associated with only one output $f(X)$.

1.1 Special Functions

Need to be careful with something like the following:

$$x^2 + y^2 = 25 \tag{1}$$

$$y^2 = 25 - x^2 \tag{2}$$

$$y = \pm\sqrt{25 - x^2} \tag{3}$$

This isn't a function because there can always be two values (plus or minus) that satisfy y^2 .

1.1.1 Piecewise functions

One of the most common functions is the absolute value function, which is an example of a *piecewise function*:

$$|x| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases} \tag{4}$$

1.1.2 Domain and range

Domain: All input values for a function.

Range: All output values for a function.

There can be physical restraints (eg, no negative distance), or formulaic restraints (eg, $1/x$ $x \neq 0$).

Natural Domain: All values that 'work' in the function.

Example:

$$f(x) = x^3$$
$$x \in \mathbb{R}$$

$$g(x) = \frac{1}{(x-1)(x-3)}$$
$$x \neq 1, x \neq 3$$

Need to watch out for denominators and roots.

Left off around 50 min.