

Function Notation

Functions can be denoted as follows: $f(x)$, $g(x)$, $h(x)$, etc...

'F' of 'x'

F is a function of x

Function notation states the dependent variable first followed by the independent variable/value in brackets.

If $f(x) = 3x + 1$ then $f(2)$ means evaluate the function $f(x)$ when x is set equal to 2.

$$f(x) = 3x + 1$$

ie; Given $f(x) = 3x + 1$, then $f(2) = 3(2) + 1$

$$= 6 + 1$$

$$= 7$$

Example 1

Evaluate the following, given $f(x) = x^2 - 2x$

0, 15, 3, 12

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

$$= 1 - 2$$

$$= -1$$

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

$$= 9 + 6$$

$$= 15$$

$$c) f(8) = (8)^2 - 2(8)$$

$$= 64 - 16$$

$$= 48$$

The variable 'x' in $f(x)$ can be replaced with any expression including ones that contain the variable 'x'.

Example 2

Evaluate the following, given $f(x) = 2x + 7$

$2x^2 + 9$

$$a) f(x-3) = 2(x-3) + 7$$

$$= 2x - 6 + 7$$

$$= 2x + 1$$

$$b) f(x^2 + 1) = 2(x^2 + 1) + 7$$

$$= 2x^2 + 2 + 7$$

$$= 2x^2 + 9$$

Functions can be combined.

Example 3

Expand and simplify each function given the following definitions:

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

$$g(x) = 5x^2 - 1$$

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

$$= (2x+3) + (5x^2-1)$$

$$= 5x^2 + 2x + 2$$

b) $r(x) = 2f(x) - 5g(x)$

$$= 2(2x+3) - 5(5x^2-1)$$

$$= 4x + 6 - 25x^2 + 5$$

$$= -25x^2 + 4x + 11$$

Functions can be inserted into one another.

Example 4

Expand and simplify each function given the following definitions:

$$f(x) = 2x - 5$$

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

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

$$= 2(x^2 + 3) - 5$$

$$= 2x^2 + 6 - 5$$

$$= 2x^2 + 1$$

b) $g(f(x)) = g(2x - 5)$

$$= (2x - 5)^2 + 3$$

$$= (2x - 5)(2x - 5) + 3$$

$$= 4x^2 - 10x - 10x + 25 + 3$$

$$= 4x^2 - 20x + 28$$

Note: $f(g(x))$ does not necessarily equal $g(f(x))$.