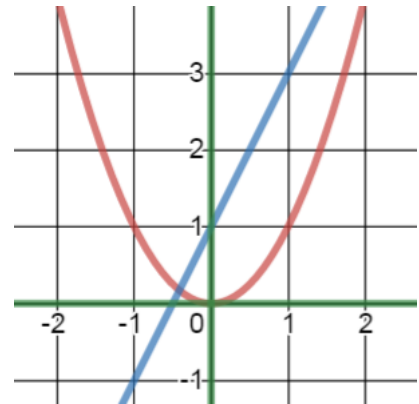

FUNCTION NOTATION

□ INTRODUCTION

The notation “ $y = \textit{whatever}$ ” is a fine way to write a function, but it has a major flaw. Suppose we are talking about two functions in the same problem — for example, the line $y = 2x + 1$ and the parabola $y = x^2$. I now ask you what the y -value is when $x = 1$. Is the answer 3 (from the line) or is the answer 1 (from the parabola)? It depends on which formula you chose.



If $x = 1$, what does y equal? It depends on which graph you're looking at.

□ FUNCTION NOTATION

This is not an acceptable situation — we'd never be able to communicate this way. This is why we use a new notation for functions: We give each function a different name, so that we can distinguish one from the other. So we can name our line and parabola functions something like

$$f(x) = 2x + 1 \quad \text{and} \quad g(x) = x^2$$

[The symbol $f(x)$ is read “ f of x ” or “ f at x ”.]

The f and the g are the names of the functions, and the x 's in parentheses just make it clear which variable is the input. So, for example, in the function f , the input is x , and the output is $f(x)$ (that is, $2x + 1$).

Now, with this new notation, if I specify an input of $x = 1$, it's fair to ask you what $f(1)$ is, and you'll know for sure that it's 3, because I gave

you both the input (the 1), and the function f . On the other hand, if I asked what $g(1)$ is, you'd be confident that it's 1. Get it??

EXAMPLE 1: **Given the three functions**

$$f(x) = 3x - 10$$

$$g(x) = x^2 + 1$$

$$h(x) = \frac{1}{x}$$

calculate each of the functional values:

A. $f(5) = 3(5) - 10 = 15 - 10 = 5$

B. $g(5) = 5^2 + 1 = 25 + 1 = 26$

C. $h(5) = \frac{1}{5}$

D. $f(10) = 3(10) - 10 = 30 - 10 = 20$

E. $g(\sqrt{7}) = (\sqrt{7})^2 + 1 = 7 + 1 = 8$

F. $h(0) = \frac{1}{0}$, which is **undefined**

Homework

1. Let $f(x) = x^2 + 3x$

$$g(x) = 5 - x$$

$$h(x) = \sqrt[3]{x+1}$$

Calculate:

a. $f(7)$

b. $g(7)$

c. $f(0)$

d. $g(0)$

e. $f(10)$

f. $g(10)$

g. $f(-5)$

h. $g(-5)$

i. $h(0)$

j. $h(-28)$

k. $h(-1)$

l. $f(-1)$

Solutions

1. a. $f(7) = 7^2 + 3(7) = 49 + 21 = 70$ b. $g(7) = 5 - 7 = -2$
c. 0 d. 5 e. 130 f. -5 g. 10 h. 10
i. 1 j. -3 k. 0 l. -2