

Lesson 1 Combining Functions Algebraically

Sum, Difference, Product, and Quotient of Functions

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

$$(f - g)(x) = f(x) - g(x)$$

$$(f \cdot g)(x) = f(x) \cdot g(x)$$

$$\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}, \text{ where } g(x) \neq 0$$

Example 1

Write an expression for each combination of functions, given the functions $f, g, h,$ and k are defined as follows:

$$f(x) = 2x - 5, \quad g(x) = (x + 2)^2, \quad h(x) = x^2 - 1, \quad k(x) = x + 1$$

a.) $f(x) + g(x)$

b.) $h(x) - k(x)$

c.) $(f \cdot h)(2) + (g \cdot k)(-1)$

Example 2

Write an expression for each combination of functions, given the functions f , g , h , and k are defined as follows:

$$f(x) = 2x + 6, \quad g(x) = x^3, \quad h(x) = x^2 + x - 6, \quad k(x) = 2$$

a.) $f(x) \cdot g(x)$

b.) $\frac{k(1)}{g(2)}$

c.) $\left(\frac{hk}{f}\right)(x)$

Example 3

a) Given $f(x) = x^2 - 9$ and $g(x) = x - 3$, write an explicit equation for $h(x) = \frac{f(x)}{g(x)}$.

b) State the domain of $h(x)$.

c) Write an equation for $h(x) = \frac{g(x)}{f(x)}$

Example 4

Given $p(x) = x^2 - 25$, write the equations for two functions $f(x)$ and $g(x)$ so that $p(x) = f(x) \cdot g(x)$.