

Sum, Difference, Product, Quotient of Functions



For two functions f and g , the sum, difference, product, and quotient of functions

$f + g$, $f - g$, $f \cdot g$, and f/g are defined as follows:

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

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

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

$$\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}$$

Examples:

$$f(x) = 3\sqrt{x} - 2 \quad \text{and} \quad g(x) = x^2 + 5$$

All examples below use $x = 4$.

1) Find $f + g$

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

$$(f + g)(x) = 3\sqrt{x} - 2 + x^2 + 5$$

$$1) (f + g)(4) = f(4) + g(4)$$

$$(f + g)(4) = 3\sqrt{4} - 2 + 4^2 + 5$$

$$(f + g)(4) = 6 - 2 + 16 + 5 = 25$$

2) Find $f - g$

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

$$(f - g)(x) = 3\sqrt{x} - 2 - (x^2 + 5)$$

$$2) (f - g)(4) = f(4) - g(4)$$

$$(f - g)(4) = 3\sqrt{4} - 2 - (4^2 + 5)$$

$$(f - g)(4) = 6 - 2 - 16 - 5 = -17$$

3) Find $f \cdot g$

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

$$(f \cdot g)(x) = (3\sqrt{x} - 2) \cdot (x^2 + 5)$$

$$3) (f \cdot g)(4) = f(4) \cdot g(4)$$

$$(f \cdot g)(4) = (3\sqrt{4} - 2) \cdot (4^2 + 5)$$

$$(f \cdot g)(4) = (6 - 2) \cdot (16 + 5) = 4(21) = 84$$

4) Find f/g

$$\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}$$

$$\left(\frac{f}{g}\right)(x) = \frac{3\sqrt{x} - 2}{x^2 + 5}$$

$$4) \left(\frac{f}{g}\right)(4) = \frac{3\sqrt{4} - 2}{4^2 + 5}$$

$$\left(\frac{f}{g}\right)(4) = \frac{6 - 2}{16 + 5} = \frac{4}{21}$$