

Exercise 9

Given $f(x) = 3x^2$ and $g(x) = \sqrt{x-5}$, find $f + g$, $f - g$, fg , and $\frac{f}{g}$. Determine the domain for each function in interval notation.

Solution

Determine each of the functions.

$$f + g = f(x) + g(x) = 3x^2 + \sqrt{x-5}, \quad \text{Domain: } x - 5 \geq 0 \rightarrow x \geq 5 \Rightarrow [5, \infty)$$

$$f - g = f(x) - g(x) = 3x^2 - \sqrt{x-5}, \quad \text{Domain: } x - 5 \geq 0 \rightarrow x \geq 5 \Rightarrow [5, \infty)$$

$$fg = f(x)g(x) = 3x^2\sqrt{x-5}, \quad \text{Domain: } x - 5 \geq 0 \rightarrow x \geq 5 \Rightarrow [5, \infty)$$

$$\frac{f}{g} = \frac{f(x)}{g(x)} = \frac{3x^2}{\sqrt{x-5}}, \quad \text{Domain: } x - 5 > 0 \rightarrow x > 5 \Rightarrow (5, \infty)$$