

Exercise 39

For the following exercises, for each pair of functions, find a. $f + g$ b. $f - g$ c. $f \cdot g$ d. f/g . Determine the domain of each of these new functions.

$$f(x) = 9 - x^2, g(x) = x^2 - 2x - 3$$

Solution

$$f + g = f(x) + g(x) = (9 - x^2) + (x^2 - 2x - 3) = -2x + 6 \quad \text{Domain: } \{x \mid -\infty < x < \infty\}$$

$$f - g = f(x) - g(x) = (9 - x^2) - (x^2 - 2x - 3) = -2x^2 + 2x + 12 \quad \text{Domain: } \{x \mid -\infty < x < \infty\}$$

$$f \cdot g = f(x)g(x) = (9 - x^2)(x^2 - 2x - 3) = 3x^3 + 7x^2 + 5x + 1 \quad \text{Domain: } \{x \mid -\infty < x < \infty\}$$

$$f/g = \frac{f(x)}{g(x)} = \frac{9 - x^2}{x^2 - 2x - 3} = \frac{9 - x^2}{(x - 3)(x + 1)} \quad \text{Domain: } \{x \mid x \neq -1, x \neq 3\}$$