Combining Functions

Exercises

1. Let \( f(x) = x + 5 \) and \( g(x) = x^2 - 2x + 1 \). Find each of the following functions and their domains.
   a. \( f + g \)
   b. \( f - g \)
   c. \( fg \)
   d. \( \frac{f}{g} \)

2. Let \( f(x) = \sqrt{x + 3} \) and \( g(x) = 3x \). Find each of the following functions and their domains.
   a. \( f + g \)
   b. \( f - g \)
   c. \( fg \)
   d. \( \frac{f}{g} \)

3. Let \( f(x) = \frac{1}{x} \) and \( g(x) = x + 2 \). Find each of the following functions and their domains.
   a. \( f + g \)
   b. \( f - g \)
   c. \( fg \)
   d. \( \frac{f}{g} \)
   e. \( \frac{g}{f} \)

4. Let \( f(x) = \sqrt{4-x} \) and \( g(x) = \sqrt{4+x} \).
   a. Use your knowledge of transforming functions to graph \( f \) and \( g \) on the same axes and determine their domains.
   b. Use pointwise addition to graph the sum \( f + g \).

5. Let \( f(x) = x^2 - x + 1 \) and \( g(x) = 2x + 3 \). Find \( f \circ g \) and \( g \circ f \) and their domains.

6. Let \( f(x) = \sqrt{x+2} \) and \( g(x) = x - 3 \). Find \( f \circ g \) and \( g \circ f \) and their domains.

7. Let \( f(x) = x^2 + 1 \) and \( g(x) = \frac{1}{x} \). Find \( f \circ g \) and \( g \circ f \) and their domains.

8. Let \( f(x) = x^2 + 2 \) and \( g(x) = \sqrt{x-2} \). Find \( f \circ g \) and \( g \circ f \) and their domains.

9. If \( (f \circ g)(x) = (3x + 2)^2 - 5(3x + 2) \), find \( f \) and \( g \).

10. If \( (f \circ g)(x) = 2\sqrt{x+1} - 3 \), find \( f \) and \( g \).

11. If \( (f \circ g)(x) = \frac{2(x^2 - 1)^3 + 5}{(x^2 - 1) + 4} \), find \( f \) and \( g \).