Pages 17–19 Exercises

11. $f(x) + g(x) = x^2 - 2x + x + 9$
$= x^2 - x + 9$

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

$f(x) \cdot g(x) = (x^2 - 2x)(x + 9)$
$= x^3 + 7x^2 - 18x$

$\left(\frac{f}{g}\right)(x) = \frac{x^2 - 2x}{x + 9}, x \neq 9$

12. $f(x) + g(x) = \frac{x}{x+1} + x^2 - 1$
$= \frac{x}{x+1} + \frac{(x^2-1)(x+1)}{x+1}$
$= \frac{x}{x+1} + \frac{x^3 + x^2 - x - 1}{x+1}$
$= \frac{x^3 + x^2 - 1}{x+1}, x \neq -1$

$f(x) - g(x) = \frac{x}{x+1} - (x^2 - 1)$
$= \frac{x}{x+1} - \frac{(x^2-1)(x+1)}{x+1}$
$= \frac{x}{x+1} - \frac{x^3 + x^2 - x - 1}{x+1}$
$= \frac{-x^3 - x^2 + 2x + 1}{x+1}, x \neq -1$

$f(x) + g(x) = \frac{x}{x+1} \cdot (x^2 - 1)$
$= \frac{x(x+1)(x-1)}{x+1}$
$= x^2 - x, x \neq -1$

$\left(\frac{f}{g}\right)(x) = \frac{\frac{x}{x+1}}{x^2 - 1}$
$= \frac{x}{x+1} \cdot \frac{1}{x^2 - 1}$
$= \frac{x}{x^3 + x^2 - x - 1}, x \neq -1 \text{ or } 1$

13. $f(x) + g(x) = \frac{3}{x-7} + x^2 + 5x$
$= \frac{3}{x-7} + \frac{(x^2+5x)(x-7)}{x-7}$
$= \frac{3}{x-7} + \frac{x^3 - 7x^2 + 5x^2 - 35x}{x-7}$
$= \frac{x^3 - 2x^2 - 35x + 3}{x-7}, x \neq 7$

$f(x) - g(x) = \frac{3}{x-7} - (x^2 + 5x)$
$= \frac{3}{x-7} - \frac{(x^2+5x)(x-7)}{x-7}$
$= \frac{3}{x-7} - \frac{x^3 - 7x^2 + 5x^2 - 35x}{x-7}$
$= -\frac{x^3 - 2x^2 - 35x - 3}{x-7}, x \neq 7$

$f(x) \cdot g(x) = \frac{3}{x-7} \cdot (x^2 + 5x)$
$= \frac{3x^2 + 15x}{x-7}, x \neq 7$

$\left(\frac{f}{g}\right)(x) = \frac{\frac{3}{x-7}}{x^2 + 5x}$
$= \frac{3}{x-7} \cdot \frac{1}{x^2 + 5x}$
$= \frac{3}{x^3 - 2x^2 - 35x}, x \neq -5, 0, 7$

14. $f(x) + g(x) = x + 3 + \frac{2x}{x-5}$
$= \frac{(x+3)(x-5)}{x-5} + \frac{2x}{x-5}$
$= \frac{x^2 - 2x - 15}{x-5} + \frac{2x}{x-5}$
$= \frac{x^2 - 15}{x-5}, x \neq 5$

$f(x) - g(x) = x + 3 - \left(\frac{2x}{x-5}\right)$
$= \frac{(x+3)(x-5)}{x-5} - \frac{2x}{x-5}$
$= \frac{x^2 - 2x - 15}{x-5} - \frac{2x}{x-5}$
$= \frac{x^2 - 4x - 15}{x-5}, x \neq 5$

$f(x) \cdot g(x) = (x + 3) - \left(\frac{2x}{x-5}\right)$
$= \frac{2x^2 + 6x}{x-5}, x \neq 5$

$\left(\frac{f}{g}\right)(x) = \frac{x+3}{\frac{2x}{x-5}}$
$= x + 3 \cdot \frac{x-5}{2x}$
$= \frac{x^2 - 2x - 15}{2x}, x \neq 0 \text{ or } 5$