Composite Functions - Practice (and solutions)

For the given functions f and g, find (answer on the back)

(a) $(f \circ g)(x)$ (b) $(g \circ f)(x)$ (c) $(f \circ f)(x)$ (d) $(g \circ g)(x)$

1. $f(x) = 2x + 3, \quad g(x) = 3x$

2. $f(x) = \sqrt{x}, \quad g(x) = x^2$

3. $f(x) = \dfrac{x+1}{x-1}, \quad g(x) = \dfrac{x-1}{x+1}$

4. $f(x) = x + \dfrac{1}{x}, \quad g(x) = x^2$

For each of the following problems, show that $(f \circ g)(x) = (g \circ f)(x) = x$.

1. $f(x) = 2x, \quad g(x) = \frac{1}{2}x$

2. $f(x) = ax + b, \quad g(x) = \frac{1}{a}(x - b), \quad a \neq 0$

3. $f(x) = \frac{1}{x}, \quad g(x) = \frac{1}{x}$

4. $f(x) = \frac{2x + 1}{x - 1}, \quad g(x) = \frac{x + 1}{x - 2}$