

Unit 1 Operations and Compositions of Functions
Practice1.) Given $f(x) = 2x - 5$ and $g(x) = 2 - x$, find

(a) $(f + g)(x)$ $f(x) + g(x)$

$$2x - 5 + 2 - x$$

$$\boxed{x - 3}$$

(b) $(f - g)(6)$

$$2(6) - 5 - (2 - 6)$$

$$7 + 4 = \boxed{11}$$

(c) $(fg)(x)$

$$(2x - 5)(2 - x)$$

$$4x - 2x^2 - 10 + 5x$$

$$\boxed{-2x^2 + 9x - 10}$$

(d) $\left(\frac{f}{g}\right)(x)$

$$\boxed{\frac{2x - 5}{2 - x}}$$

2.) Given $f(x) = \frac{2}{x}$ and $g(x) = \frac{1}{x^2}$, find

(a) $(f + g)(x)$

$$x \cdot \frac{2}{x} + \frac{1}{x^2}$$

$$\frac{2x}{x^2} + \frac{1}{x^2} = \boxed{\frac{2x + 1}{x^2}}$$

(c) $(fg)(x)$

$$\frac{2}{x} \cdot \frac{1}{x^2} = \boxed{\frac{2}{x^3}}$$

(b) $(f - g)(x)$

$$\frac{2x}{x^2} - \frac{1}{x^2} = \boxed{\frac{2x - 1}{x^2}}$$

(d) $\left(\frac{f}{g}\right)(3)$

$$= \frac{\frac{2}{3} \cdot \frac{1}{1}}{\frac{1}{9}} = \boxed{6}$$

3.) Given $f(x) = x^2$ and $g(x) = 2x + 5$, find

(a) $(f + g)(x)$

$$\boxed{x^2 + 2x + 5}$$

(b) $(f - g)(-4)$

$$16 - -3$$

$$\boxed{19}$$

(c) $(fg)(-2)$

$$(4)(1) = \boxed{4}$$

(d) $\left(\frac{f}{g}\right)(x)$

$$\boxed{\frac{x^2}{2x + 5}}$$

4.) Given $f(x) = 4x - 3$ and $g(x) = 2x - 5$, find

(a) $f(g(x))$

$$\begin{aligned} &4(2x-5) - 3 \\ &8x - 20 - 3 \\ &\boxed{8x - 23} \end{aligned}$$

(b) $g(f(x))$

$$\begin{aligned} &2(4x-3) - 5 \\ &8x - 6 - 5 \\ &\boxed{8x - 11} \end{aligned}$$

5.) Given $f(x) = x^2 - 3x$ and $g(x) = x - 3$, find

(a) $(f \circ g)(x)$

$$\begin{aligned} &(x-3)^2 - 3(x-3) \\ &x^2 - 6x + 9 - 3x + 9 \\ &x^2 - 9x + 18 \end{aligned}$$

(b) $(g \circ f)(x)$

$$x^2 - 3x - 3$$

(c) $f(g(1))$

$$\begin{aligned} f(-2) &= 4 + 6 \\ &= \boxed{10} \end{aligned}$$

(d) $(g \circ f)(2)$

$$g(-2) = \boxed{-5}$$

(e) $(f \circ f)(x)$

$$\begin{aligned} &(x^2 - 3x)^2 - 3(x^2 - 3x) \\ &x^4 - 6x^3 + 9x^2 - 3x^2 + 9x \\ &x^4 - 6x^3 + 6x^2 + 9x \end{aligned}$$

(f) $g(g(10))$

$$g(-7) = \boxed{4}$$