1. Evaluate the difference quotient for the given function. Simplify your answer.

$$f(x) = x^3, \quad \frac{f(a+h) - f(a)}{h}$$

2. Evaluate the difference quotient for the given function. Simplify your answer.

$$f(x) = \frac{x+3}{x+1}, \quad \frac{f(x) - f(1)}{x-1}$$

3. Find the domain of the function.
   (i) $\dfrac{x+4}{x^2-9}$
   (ii) $\sqrt[3]{2t-1}$
   (iii) $\dfrac{1}{\sqrt[4]{x^2-5x}}$
   (iv) $F(p) = \sqrt{2-\sqrt{p}}$
   (v) $\sqrt{3-t} - \sqrt{2+t}$
   (iii) $\dfrac{2x^3-5}{x^2+x-6}$

4. Find the functions $f \circ g$, $g \circ f$, $f \circ f$, and $g \circ g$ and their domains.

(a) $f(x) = x^2 - 1,\ g(x) = 2x + 1$

(b) $f(x) = 1 - 3x,\ g(x) = \cos x$

(c) $f(x) = \sqrt{x},\ g(x) = \sqrt[3]{1 - x}$

(d) $f(x) = x + \dfrac{1}{x},\ g(x) = \dfrac{x+1}{x+2}$

5. Let

$$f(x) = \begin{cases} x^2 - 1 & \text{if } x \leq 0 \\ x - 1 & \text{if } 1 \leq x \leq 4 \\ 5 & \text{if } x > 4 \end{cases}$$

(a) Compute $f(0)$, $f(2)$, $f(5)$ and $f(-1)$.

(b) Graph the function.

6. In a certain state, the maximum speed permitted on freeways is 65 mi/h and the minimum speed is 40 mi/h. The fine for violating these limits is \$15 for every mile per hour above the maximum speed or below the minimum speed. Express the amount of the fine F as a function of the driving speed x and graph $F(x)$ for $0 \leq x \leq 100$.