1. Suppose $f(x) = x^2 + 1$. Find $\frac{f(x+h)-f(x)}{h}$ and simplify by canceling the factor of h.

2. Suppose $f(x) = \begin{cases} -5 & \text{if } x < -1 \\ x^2 + 1 & \text{if } -1 \leq x < 2 \\ 2 - x & \text{if } x \geq 2 \end{cases}$

a) Find $f(1)$.

b) Find $f(2)$.

c) Find $f(-2)$.

d) Find the domain of f.

3. Find the domain of $f(x) = \frac{x^4}{x^2+x-6}$.

4. Suppose $f(x) = \frac{\sqrt{3-x}}{x^2-2x}$.

a) Find $f(-1)$, $f(0)$, $f(1)$, $f(2)$, $f(3)$, $f(4)$.

b) Find the domain of f.

5. Suppose $g(x) = \frac{-x^2+1}{\sqrt{3x+4}}$.

a) Find $g(-1)$, $g(0)$, $g(1)$, $g(4)$.

b) Find the domain of g.

6. Suppose $f(x) = x^2 + x$.

a) Find $\frac{f(x+h)-f(x)}{h}$ and simplify by canceling the factor of h.

b) Find the domain of f.

7. Suppose $f(x) = \sqrt{2x+3}$.

a) Find $\frac{f(x+h)-f(x)}{h}$ and simplify by canceling the factor of h.

b) Find the domain of f.

8. Suppose $f(x) = \frac{2}{x+1}$.

a) Find $\frac{f(x+h)-f(x)}{h}$ and simplify by canceling the factor of h.

b) Find the domain of f.

9. Suppose $f(x) = \frac{x}{x-3}$.

a) Find $\frac{f(x+h)-f(x)}{h}$ and simplify by canceling the factor of h.

b) Find the domain of f.

10. Suppose $f(x) = \begin{cases} \frac{1}{x} & \text{if } x < -1 \\ \sqrt[3]{x} & \text{if } x > -1 \end{cases}$

a) Find $f(-2)$, $f(-1)$, $f\left(-\frac{1}{8}\right)$, $f(0)$, $f(27)$.

b) Find the domain of f.

11. Suppose $g(x) = \begin{cases} |x| & \text{if } -2 \leq x < 0 \\ 168 & \text{if } x = 0 \\ \sqrt{x+2} & \text{if } x > 0 \end{cases}$

a) Find $g(-3)$, $g(-2)$, $g(0)$, $g(1)$, $g(98)$.

b) Find the domain of g.

Optional exercises from the Sullivan book if you'd like more practice:
2.1 (p.56) #43cdefgh, 45cdefgh, 51-59 odd, 63, 79-87 odd
2.4 (p.90) #27 (don't sketch), 29 (don't sketch), 31-39 odd (part a only)