

**Functions**

Find the domain of each of the following. Express your answer in interval notation.

1.  $f(x) = \frac{x^2 - 9}{4x^2 + 17x + 15}$

2.  $g(x) = \sqrt{16 - x^2}$

3.  $h(x) = \frac{\sqrt{3x + 5}}{x - 6}$

4.  $k(x) = \sqrt{\frac{x + 4}{x^2 - 9}}$

Evaluate and simplify the difference quotient  $\frac{f(x+h) - f(x)}{h}$  for each of the following functions.

5.  $f(x) = 5x^2 - 3x + 4$

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

7.  $f(x) = \frac{4}{x - 6}$

8.  $f(x) = \frac{7}{2x + 1}$

9.  $f(x) = \sqrt{x + 5}$

10.  $f(x) = \sqrt{3x - 8}$

## Answers

1.  $\mathbb{R} \setminus \left\{ -3, -\frac{5}{4} \right\}$

2.  $[-4, 4]$

3.  $\left[ -\frac{5}{3}, 6 \right) \cup (6, \infty)$

4.  $[-4, -3) \cup (3, \infty)$

5.  $10x + 5h - 3$

6.  $-6x - 3h + 2$

7.  $\frac{-4}{(x+h-6)(x-6)}$

8.  $\frac{-14}{(2x+2h+1)(2x+1)}$

9.  $\frac{1}{\sqrt{x+h+5} + \sqrt{x+5}}$

10.  $\frac{3}{\sqrt{3x+3h-8} + \sqrt{3x-8}}$