

Limits of the Difference Quotient

Directions: Find $\lim_{h \rightarrow 0} \frac{f(x+h)-f(x)}{h}$ and $\lim_{x \rightarrow a} \frac{f(x)-f(a)}{x-a}$ for each of the following functions.

1. $f(x) = x$

2. $f(x) = 2x - 3$

3. $f(x) = x^2 + 1$

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

5. $f(x) = 3x^3 - x - 1$

6. $f(x) = \frac{1}{x}$

7. $f(x) = \frac{2}{x^2}$

8. $f(x) = \frac{2}{x+3}$

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

10. $f(x) = \frac{1}{\sqrt{x}}$