

1. Calculate the following limits.

(a) $\lim_{x \rightarrow 1} \frac{2x - 2}{x^3 - 1}$.

(b) $\lim_{x \rightarrow -5} \sqrt{6 + x}$.

(c) $\lim_{x \rightarrow 2} \frac{1}{x} + x^2$.

(d) $\lim_{x \rightarrow 0} \frac{\cos(2x) - 1}{x}$.

(e) $\lim_{x \rightarrow -2} 2 \sin(x + 2)$.

(f) $\lim_{x \rightarrow 0} \frac{\sin(x)}{\sin(4x)}$.

(g) $\lim_{x \rightarrow 3^+} \frac{x^2}{x - 3}$.

(h) $\lim_{x \rightarrow -1} \frac{x - 1}{x^2 - 1}$.

(i) $\lim_{x \rightarrow 0} \frac{-x \tan(x)}{\sin(x)}$.

(j) $\lim_{x \rightarrow \infty} \frac{2x - 5}{x^3 + 4x}$.

(k) $\lim_{x \rightarrow \infty} \frac{1 - 3x^2}{x^2 + 2x - 1}$.

(l) $\lim_{x \rightarrow \infty} \frac{x^4 - 2x^2 + 1}{x + 7}$.

2. Calculate the derivatives of the following functions.

(a) $f(x) = x^6 + 2x^2 - 7x$.

(b) $f(x) = \frac{x^2}{x + 1}$.

(c) $f(x) = x \tan(x)$.

(d) $f(x) = \frac{3x^2 - 2x + 1}{2x^2 + 3}$.

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

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

(g) $f(x) = \sin(2x)$.

(h) $f(x) = \sin(x) \sec(x)$.

(i) $f(x) = \frac{1}{(x + 2)^5}$.

(j) $f(x) = \cos(3x^2 - 7)$.

(k) $f(x) = \sin^2(x^2)$.

(l) $f(x) = (x^3 - 2x) \tan(2x)$.

(m) $f(x) = \frac{\cos(x)}{x^2 + 2}$.

(n) $f(x) = x^2 \csc(x)$.

(o) $f(x) = \frac{\sin^2(x)}{1 - \cos(3x)}$.

(p) $f(x) = (x^2 + 2x - 1)(3x - 4)$.