
Exercise 1 Find the limit or show that it does not exist.

(a) $\lim_{x\to\infty} \dfrac{1-x^2}{x^3-x+1}$

(b) $\lim_{x\to-\infty} \dfrac{4x^3+6x^2-2}{2x^3-4x+5}$

(c) $\lim_{t\to\infty} \dfrac{t-t\sqrt{t}}{2t^{3/2}+3t-5}$

(d) $\lim_{x\to\infty} \dfrac{x^2}{\sqrt{x^4+1}}$

(e) $\lim_{x\to-\infty} \dfrac{\sqrt{1+4x^6}}{2-x^3}$

(f) $\lim_{x\to\infty} (\sqrt{4x^2+3x}+2x)$

(g) $\lim_{x\to-\infty} (\sqrt{4x^2+3x}+2x)$

(h) $\lim_{x\to\infty} \sqrt{x^2+1}$

(i) $\lim_{x\to\infty} (e^{-x}+2\cos(3x))$

(j) $\lim_{x\to-\infty} \dfrac{1+x^6}{x^4+1}$

(k) $\lim_{x\to\infty} \dfrac{e^{3x}-e^{-3x}}{e^{3x}+e^{-3x}}$

(l) $\lim_{x\to\infty} \dfrac{\sin^2(x)}{x^2+1}$

Exercise 2 Find the limit. Hint: Consider $t = \frac{1}{x}$.

$$\lim_{x \to 0^+} \tan^{-1}(\ln(x))$$

Exercise 3 Find the limit.

$$\lim_{x \to \infty} (\ln(2 + x) - \ln(1 + x))$$

Exercise 4 Find the horizontal and vertical asymptotes of the graph of the function

$$y = \frac{2x^2 + 1}{3x^2 + 2x - 1}$$

Exercise 5 Find the horizontal and vertical asymptotes of the graph of the function

$$y = \frac{1 + x^3}{x - x^3}$$

Exercise 6 Find the limits as $x \to \infty$ and as $x \to -\infty$. Use this information, together with intercepts, to give a rough sketch of the graph of the function $y = x^3(x + 2)^2(x - 1)$.