

Limits at infinity. Asymptotes.

2.3.1

Evaluate the limit if it exists

a) $\lim_{x \rightarrow \infty} \frac{x^2+1}{2x^3+5}$

b) $\lim_{x \rightarrow \infty} \frac{2+x-x^2}{3+4x^2}$

c) $\lim_{x \rightarrow \infty} \frac{\sqrt{1+2x^2}}{x+2}$

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

2.3.2

In each of the following cases, determine whether or not the given limit exists. If not, explain why the limit does not exist. In particular if the trend is to $\pm\infty$, indicate so.

(a)

$$\lim_{x \rightarrow \infty} \frac{x^2 - x - 6}{x^2 - 9}$$

(b)

$$\lim_{x \rightarrow -\infty} \frac{\sqrt{4x^2 - 1}}{x + 10000}$$

2.3.3

Find the horizontal and vertical asymptotes for the graph of $f(x) = \frac{5x^2+1}{-2+x+x^2}$