

Horizontal and Slant Asymptotes

1. Evaluate the following limits at infinity

(i)

$$\lim_{x \rightarrow -\infty} (3x^7 + x^2) = -\infty$$

(ii)

$$\lim_{x \rightarrow \infty} \frac{4x^4 + 7}{\sqrt{64x^8 + x^4 - 2x^2 + 1}} = \frac{1}{16}$$

2. Find $\lim_{x \rightarrow \infty} f(x)$ and $\lim_{x \rightarrow -\infty} f(x)$ for the following functions and state whether they have horizontal asymptotes or not.

(i)

$$f(x) = \frac{4x}{20x + 1}$$

Look at a previous worksheet.

(ii)

$$f(x) = \frac{6x^2 + 1}{\sqrt{4x^4 + 3x + 1}}$$

$$\text{Answer: } y = \frac{3}{2}$$

3. Find both vertical and slant asymptotes of the following functions

(i)

$$f(x) = \frac{x^2 - 3}{x + 6}$$

V. Asymptote at $x = -6$ and slant asymptote of $y = x - 6$

(ii)

$$f(x) = \frac{4x^3 + 4x^2 + 7x + 4}{x^2 + 1}$$

No vertical asymptote, slant asymptote of $y = 4x + 4$.