

1.5 – Limits Involving Infinity, Part II

1. Find the following limits.

a. $\lim_{x \rightarrow -\infty} (4x - 3)$

b. $\lim_{x \rightarrow \infty} (4x^2 + 5x + 2)$

c. $\lim_{x \rightarrow \infty} (x^3 - 6x)$

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

e. $\lim_{x \rightarrow -\infty} e^{2x}$

f. $\lim_{x \rightarrow \infty} e^{x^2+x}$

Important Rule for Limits at Infinity

Suppose $c \in \mathbb{R}$, $r \in \mathbb{Q}$ such that $r > 0$, and x^r is defined for all x .

Then

$$\lim_{x \rightarrow \infty} \frac{c}{x^r} = 0 \quad \text{and} \quad \lim_{x \rightarrow -\infty} \frac{c}{x^r} = 0$$

2. Find the following limits. What does each result indicate about the end behavior of the function?

a. $\lim_{x \rightarrow \infty} \frac{3x^3 - x + 2}{4x^5 - 1}$

b. $\lim_{x \rightarrow -\infty} \frac{x^2 - 2x^6}{5x^6 - 3x + 4}$

c. $\lim_{x \rightarrow -\infty} \frac{x^{5/3} - 2}{x^{2/3} + 1}$

d. $\lim_{x \rightarrow \infty} \frac{x-1}{\sqrt{5x^2+2}}$

e. $\lim_{x \rightarrow -\infty} \frac{x-1}{\sqrt{5x^2+2}}$