

## 2.6-Limits at Infinity

In 2.2, we learned that if  $y \rightarrow \pm\infty$  as  $x \rightarrow a$ , then the graph of  $f$  has a *vertical asymptote* at  $x = a$ . Similarly, if  $y \rightarrow L$  as  $x \rightarrow \pm\infty$ , then the graph of the function has a *horizontal asymptote* at  $y = L$ .

Key Limit:  $\lim_{x \rightarrow \infty} \frac{1}{x} = 0$ .

**Computing limits at Infinity:**

*Examples:*

$$\lim_{x \rightarrow \infty} \frac{5x^2 + 7}{3x^2 - x}$$

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

Compute  $\lim_{x \rightarrow \infty} \sqrt{x^2 + 5x} - x$

Find the horizontal asymptotes of  $f(x) = \frac{\sqrt{x^2 + 2}}{3x - 6}$ .

**Behavior of Polynomials:**

**On Your Own:** 2.6 #3,8,10,11,14,17,27,29,33,35,37,45