1 2.6: Limits at Infinity

In 2.2, we learned that if \( y \to \pm \infty \) as \( x \to a \), then the graph of \( f \) has a \textbf{vertical asymptote} at \( x = a \). Similarly, if \( y \to L \) as \( x \to \pm \infty \), then the graph of the function has a \textbf{horizontal asymptote} at \( y = L \).

Key Limit: \[ \lim_{x \to \pm \infty} \frac{1}{x} = 0 \]

Computing Limits at Infinity:

Examples:

LIMITS AT INFINITY Maplet
Find the horizontal asymptotes of \( f(x) = \frac{\sqrt{x^2 + 2x}}{2x + 3} \)

**On Beyond Average:** Compute \( \lim_{x \to -\infty} \sqrt{x^2 + x + x} \)