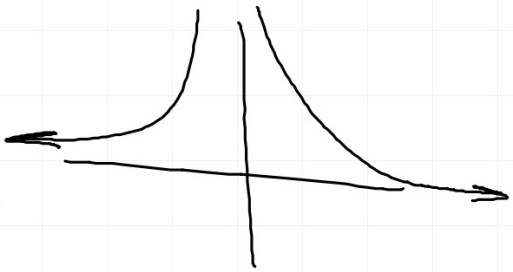
Limits at Infinity

$x \to \infty \quad x \to -\infty$

$$\lim_{x \to \infty} \frac{1}{x} = 0$$

$$\lim_{x \to \infty} \frac{x}{x^2} = 0$$



$$\frac{B}{B^2} \quad \frac{1}{B}$$

$$^{\circ}N < {}^{\circ}D \to 0$$

$$\lim_{x \to \infty} \frac{3x^2 - 2x}{x + 10} = +\infty$$

$$\frac{3(B^2)}{B} \quad 3B$$

$$\lim_{x \to -\infty} \frac{3x^2 - 2x}{x + 10} = -\infty$$

$$\frac{3(-B)^2}{-B} \quad \frac{3B^2}{-B}$$

°N > °D → $\pm\infty$

$$\lim_{x \to \infty} \frac{5x - 2}{3x - 7} = \frac{5}{3}$$

$$\frac{-B^2}{3B^2} \rightarrow$$

$$\lim_{x \to \infty} \frac{1 - x - x^2}{3x^2 + 5x} = -\frac{1}{3}$$

$$\lim_{x \to \infty} \frac{x}{x + 1} = 1$$

* $N = D$ → divide the coeff. of highest degree terms.

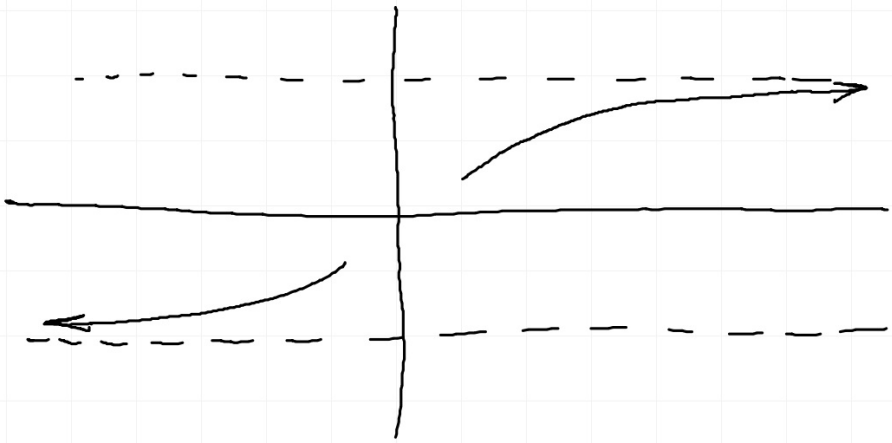
$$\lim_{x \to \infty} \frac{\sqrt{3x^2+2x-1}}{7x-3} = \frac{\sqrt{3}}{7}$$

$$\frac{\sqrt{3}\sqrt{B^2}}{7B}$$

$$\lim_{x \to -\infty} \frac{\sqrt{3x^2+2x-1}}{7x-3} = -\frac{\sqrt{3}}{7}$$

$$\frac{\sqrt{3}\sqrt{(-B)^2}}{7(-B)}$$

$$\frac{\sqrt{3}\,B}{-7B}$$



HA

f has a HA at $y=b$ iff $\lim_{x\to\pm\infty} f(x)=b$.

Find the HA (if any) of $f(x)=\dfrac{5x+2}{10x-3}$.

f has a HA at $y=\frac{1}{2}$ because $\lim_{x\to\infty} f(x)=\frac{1}{2}$.

f has a HA at $y=\frac{1}{2}$ because $\lim_{x\to-\infty} f(x)=\frac{1}{2}$.

87. Eval $\lim_{x \to \infty} \frac{3x - 5x^2}{2x^2 + 3x - 1}$

$$\lim_{x \to \infty} \frac{3x - 5x^2}{2x^2 + 3x - 1} = -\frac{5}{2}.$$

88.