Limits at Infinity

$x \to \infty$ or $x \to -\infty$

$$\frac{5B^2}{B^3} \quad \frac{5}{B}$$

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

$$\lim_{x \to \infty} \frac{5x^2}{x^3} = 0$$

$$\lim_{x \to -\infty} \frac{3}{x^2} = 0$$

$$°N < °D \to 0$$

$$\lim_{x \to \infty} \frac{3x^2 - 6}{x+5} = +\infty$$

$$\lim_{x \to -\infty} \frac{3x^2 - 6}{x+5} = -\infty$$

$°N > °D \rightarrow \nexists \ (\pm\infty)$

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

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

$-3B$

$$\lim_{x \to \infty} \frac{3x-6}{5x+4} = \frac{3}{5}$$

$$\lim_{x \to -\infty} \frac{5x^2+17x-100}{8x^2-1000x+1700} = \frac{5}{8}$$

$$\lim_{x \to \infty} \frac{1-2x-5x^2}{3x^2-6} = -\frac{5}{3}$$

$$\frac{5}{8}$$

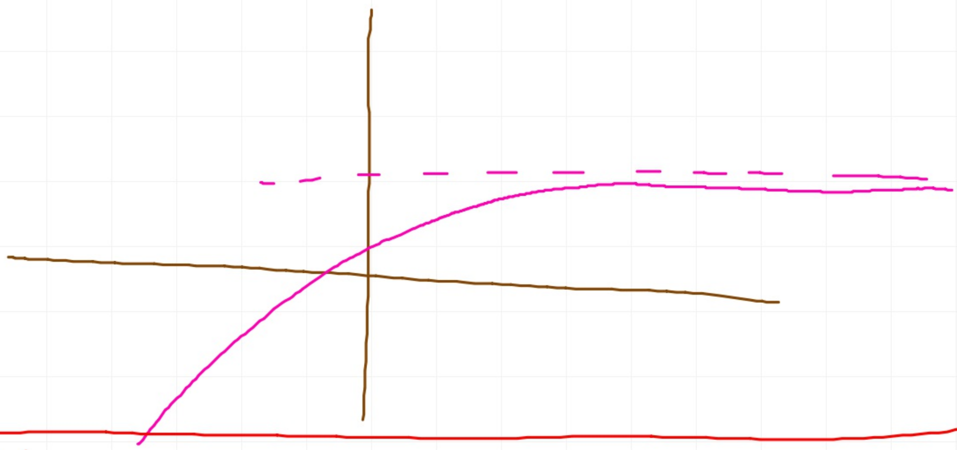
$$\frac{5(-B)^{\cancel{2}}}{8(\cancel{-B})^2}$$

$$\lim_{x \to -\infty} \frac{12x^{17} + 100x^{15}}{6x^{17} - x^{16}} = 2 \qquad \frac{12(-B)^{17}}{6(-B)^{17}} \to \frac{-12\cancel{B^{17}}}{-6\cancel{B^{17}}}$$

$°N = °D \to \div$ coefficients of highest degreed terms.

$$\lim_{x \to \infty} \frac{\sqrt{5x^2+2x-6}}{7x-3} = \frac{\sqrt{5}}{7} \qquad \frac{\sqrt{5}\,\cancel{\sqrt{B^2}}}{7\cancel{B}}$$

$$\lim_{x \to -\infty} \frac{\sqrt{5x^2+2x-6}}{7x-3} = -\frac{\sqrt{5}}{7} \qquad \frac{\sqrt{5}\sqrt{(-B)^2}}{7(-B)} \qquad \frac{\sqrt{5}\cancel{B}}{-7\cancel{B}}$$



<u>HA</u>

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

Find the HA (if any) of $f(x) = \dfrac{7x-1}{3x+4}$.

f has HA at $y = \frac{7}{3}$ because $\lim_{x \to \infty} f(x) = \frac{7}{3}$.

f has HA at $y = \frac{7}{3}$ because $\lim_{x \to -\infty} f(x) = \frac{7}{3}$.

Find the HA (if any) of $f(x) = \dfrac{\sqrt{7x^2+2x-1}}{5x-8}$.

f has a HA at $y = \frac{\sqrt{7}}{5}$ because $\lim\limits_{x \to \infty} f(x) = \frac{\sqrt{7}}{5}$.

f has a HA at $y = -\frac{\sqrt{7}}{5}$ because $\lim\limits_{x \to -\infty} f(x) = -\frac{\sqrt{7}}{5}$.