Assignment
p. 855 (5-20)

12.4 Limits to Infinity

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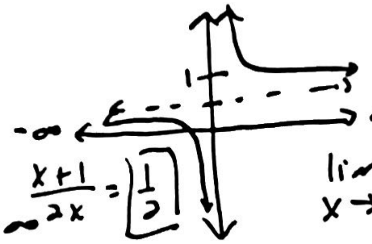
$f(x) = \dfrac{x+1}{2x}$



$\lim\limits_{x \to -\infty} \dfrac{x+1}{2x} = \boxed{\dfrac{1}{2}}$ $\qquad$ $\lim\limits_{x \to \infty} \dfrac{x+1}{2x} = \boxed{\dfrac{1}{2}}$

horizontal asymptote at $\boxed{x = \frac{1}{2}}$

The rules

$\dfrac{\infty}{\text{number or variable}} = \infty$ $\qquad$ $\dfrac{-\infty}{\text{number or var.}} = -\infty$

$\dfrac{\text{Number or variable}}{\pm\infty} = 0$ $\leftarrow$ The bigger the denominator gets the smaller the Number

$\left(\dfrac{3}{1}, \dfrac{3}{2}, \dfrac{3}{3}, \dfrac{3}{4}, \dfrac{3}{5}, \dfrac{3}{6} \ldots 0 \right)$

(9) $\lim\limits_{x \to \infty} \left(2 + \dfrac{3}{x^2}\right) = 2 + \dfrac{3}{(\infty)^2} = 2 + 0 = \boxed{2}$

(15) $\lim\limits_{x \to -\infty} \dfrac{5x-1}{3x^2+2}$

Divide every term by the variable <u>in the denominator</u> with <u>highest</u> exponent (so x^2 in this problem)

$\lim\limits_{x \to -\infty} \dfrac{\frac{5x}{x^2} - \frac{1}{x^2}}{\frac{3x^2}{x^2} + \frac{2}{x^2}}$

<u>reduce</u> $\lim\limits_{x \to -\infty} \dfrac{\frac{5}{x} - \frac{1}{x^2}}{3 + \frac{2}{x^2}}$

plug in $-\infty$ $\quad \dfrac{\frac{5}{-\infty} - \frac{1}{(-\infty)^2}}{3 + \frac{2}{(-\infty)^2}} = \dfrac{0 - 0}{3 + 0} = \dfrac{0}{3} = \boxed{0}$

(19)

$$\lim_{t \to \infty} \frac{4t^2 - 2t + 1}{-3t^2 + 2t + 2}$$

highest

$$\lim_{t \to \infty} \frac{\frac{4t^2}{t^2} - \frac{2t}{t^2} + \frac{1}{t^2}}{\frac{-3t^2}{t^2} + \frac{2t}{t^2} + \frac{2}{t^2}}$$

$$\lim_{t \to \infty} \frac{4 - \frac{2}{t} + \frac{1}{t^2}}{-3 + \frac{2}{t} + \frac{2}{t^2}}$$

$$\frac{4 - \cancel{\frac{2}{\infty}}^{\,0} - \cancel{\frac{1}{(\infty)^2}}^{\,0}}{-3 + \cancel{\frac{2}{\infty}}^{\,0} + \cancel{\frac{2}{(\infty)^2}}^{\,0}}$$

$$\boxed{\frac{4}{-3}}$$