

## ONE-SIDED LIMITS

$$\lim_{x \rightarrow 5^-} \frac{2x+3}{x-1} = \frac{13}{4}$$

$$\begin{aligned} \lim_{x \rightarrow -3^+} \frac{8x}{(x+3)^2} &= \frac{-24}{0} \\ &= \frac{-}{+} \\ &= \boxed{-\infty} \end{aligned}$$

$$\lim_{x \rightarrow 2} \frac{3x}{x-2} = \frac{6}{0} = \text{DNE}$$

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

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

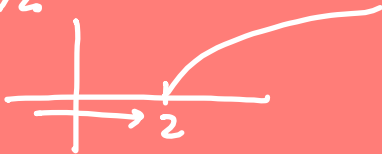
$$\lim_{x \rightarrow 4} \frac{8x^2}{(x-4)^4} = \frac{128}{0} \boxed{+\infty}$$

$$\lim_{x \rightarrow 4^-} \frac{8x^2}{(x-4)^4} = \frac{+}{+} = +\infty$$

$$\lim_{x \rightarrow 4^+} \frac{8x^2}{(x-4)^4} = \frac{+}{+} = +\infty$$

=

$$\lim_{x \rightarrow 2^-} \sqrt{x-2} = \text{DNE}$$



$$f(x) = \begin{cases} \frac{2x+1}{3x-1} & x < -1 \\ \frac{1}{(x-1)^2} & x > -1 \end{cases}$$

$$\lim_{x \rightarrow -1} f(x) = \left( \frac{1}{4} \right)$$

$$\lim_{x \rightarrow -1^-} \frac{2x+1}{3x-1} = \frac{-2+1}{-3-1} = \frac{+1}{-4}$$

$$\lim_{x \rightarrow -1^+} \frac{1}{(x-1)^2} = \frac{1}{(-2)^2} = \frac{1}{4}$$

$$f(x) = \begin{cases} x^2-3 & x < 2 \\ 4x+7 & x = 2 \\ \frac{2}{x-2} & x > 2 \end{cases}$$

$$\lim_{x \rightarrow 1} f(x) = \lim_{x \rightarrow 1} x^2 - 3 = -2$$

$$\lim_{x \rightarrow 2} f(x) = \text{DNE}$$

$$\lim_{x \rightarrow 2^-} x^2 - 3 = 1$$

$$\lim_{x \rightarrow 2^+} \frac{2}{x-2} = \frac{2}{0} = \frac{+}{+} = +\infty$$

## LIMITS TO $\pm\infty$

$$\lim_{x \rightarrow \infty} \frac{\frac{1}{x^2} x^2}{\frac{1}{x^2} 7x^2 + 3} = \frac{\infty^2}{7\infty^2 + 3} = \frac{\infty}{\infty}$$

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

$$\lim_{x \rightarrow \infty} \frac{1}{7 + \frac{3}{x^2}} = \frac{1}{7 + \frac{3}{\infty}} = \frac{1}{7}$$

$$\lim_{x \rightarrow -\infty} \frac{4x^3 - 3x^2 + 1}{5x^4 + 2x^2 - 9}$$

$$\lim_{x \rightarrow -\infty} \frac{4x^3}{5x^4}$$

$$\lim_{x \rightarrow -\infty} \frac{4}{5x} = \frac{4}{5 \cdot \infty}$$

$$= \frac{4}{-\infty}$$

$$= 0$$

$$\lim_{y \rightarrow -\infty} \frac{5y^3 + 4}{3y + 7}$$

$$\lim_{y \rightarrow -\infty} \frac{5y^{\cancel{3}^2}}{3y}$$

$$\lim_{y \rightarrow -\infty} \frac{5y^2}{3} = \frac{5(-\infty)^2}{3}$$

$$= +\infty$$

$$\lim_{x \rightarrow -\infty} \frac{\sqrt{x^2 + 13}}{6x + 5}$$

$$\lim_{x \rightarrow -\infty} \frac{\sqrt{x^2}}{6x}$$

$$\lim_{x \rightarrow -\infty} \frac{|x|}{6x}$$

$$\lim_{x \rightarrow -\infty} \frac{-x}{6x} = \left(-\frac{1}{6}\right)$$

even index  
even power  
inside  
odd power  
outside

$$\lim_{z \rightarrow -\infty} 7z - 3z^3$$

$$\lim_{z \rightarrow -\infty} -3z^3 = -3(-\infty)^3 = +\infty$$