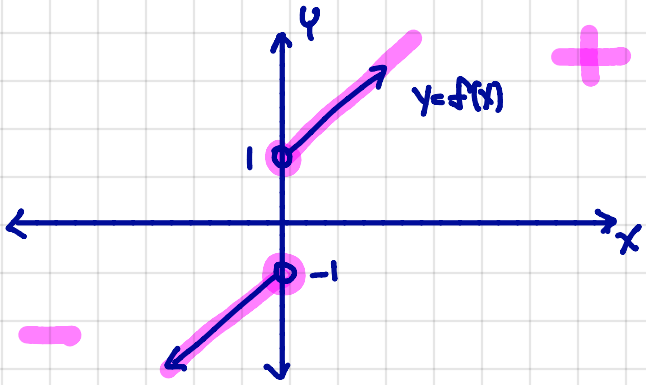
10.2 Limits (Continued)

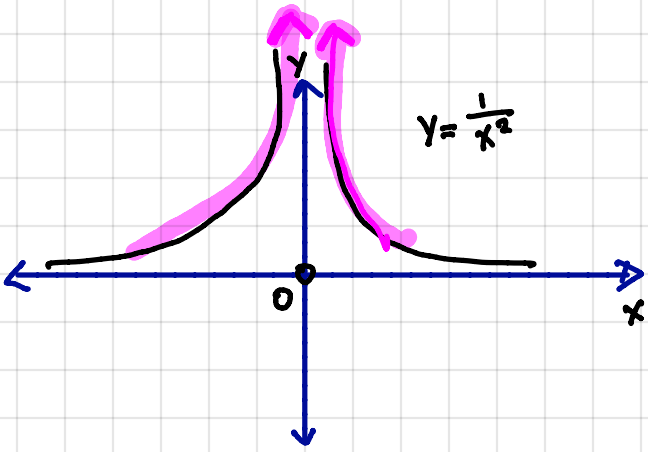


* ONE SIDED LIMITS

- what is $\lim_{x\to 0} f(x) =$ DNE

$\lim_{x\to 0^+} f(x) = 1$

$\lim_{x\to 0^-} f(x) = -1$



* INFINITY LIMITS

$\lim_{x\to 0} \frac{1}{x^2} = \infty$

Ex) $\lim_{x\to -1^+} \frac{2}{x+1} = -\infty$

Ex) $\lim_{x\to 2} \frac{x+2}{x^2-4}$ = DNE →

1) $\lim_{x\to 2^+} \frac{x+2}{x^2-4} = \infty$

2) $\lim_{x\to 2^-} \frac{x+2}{x^2-4} = -\infty$

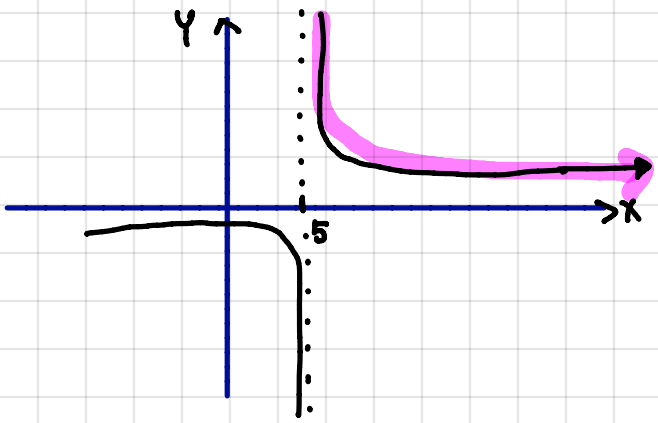
Ex) $\lim_{t\to 2} \frac{t-2}{t^2-4} = \frac{0}{0} = \lim_{t\to 2} \frac{t-2}{(t+2)(t-2)} = \frac{1}{4}$.

* LIMIT AT INFINITY

$$\lim_{x\to\infty} \frac{4}{(x-5)^3} = 0$$

$x = 100 \to \frac{4}{(95)^3} = \frac{4}{\text{⬭}}$.

$= 1000 \to \frac{4}{(995)^3} = \frac{4}{\text{⬭}}$



Ex) $\lim_{x\to\infty} \frac{4x^2+5}{2x^2+1} = \lim_{x\to\infty} \frac{\frac{4x^2+5}{x^2}}{\frac{2x^2+1}{x^2}} = \lim_{x\to\infty} \frac{4+\frac{5}{x^2}}{2+\frac{1}{x^2}}$

$= 2$.

Ex(1)

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

Ex(2)

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

* $\lim_{x\to\infty} \frac{4x+5}{2x^2+1} = 0$

⇒ Greatest Power in denominator. It makes limit 0

Ex) $\lim_{x \to -\infty} (x^3 - x^2 + x - 2)$

↳ GREATEST POWER

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

$= -\infty$

GRAPH VALUE

$\Rightarrow \lim_{x \to -\infty} (x^3) = -\infty$

ONLY NEED TO THINK GREATEST POWER

x	x^2	x^3
-1	1	-1
-2	4	-8
-3	9	-27
-4	16	-64
$\vdots$	$\vdots$	$\vdots$
$-\infty$	∞	$-\infty$

x^3 → It increase faster than x^2

ALWAYS!

HIGHEST EXPONENT MATTERS.

GRAPH CHANGES BY

GREATEST POWER