[Limit Video](#)

One-Sided Limits

$\lim\limits_{x \to 2^+}$ means that x approaches 2 from the right (larger than 2)

$\lim\limits_{x \to 2^-}$ means that x approaches 2 from the left (smaller than 2)

Ex. $\lim\limits_{x \to 3^-} \dfrac{2x}{x-3} = \dfrac{6}{-0} = -\infty$

Thm.
$$\lim_{x \to a} f(x) = L \text{ if } \lim_{x \to a^+} f(x) = L = \lim_{x \to a^-} f(x)$$

- The limit exists if both sides agree.

Ex. $\lim_{x \to 3} \dfrac{2x}{x-3} = $ DNE

$$\lim_{x \to 3^+} \frac{2x}{x-3} = \frac{6}{+0} = \infty$$

$$\lim_{x \to 3^-} \frac{2x}{x-3} = \frac{6}{-0} = -\infty$$

Ex. For the function given, find:

a. $\lim\limits_{x \to 2^+} f(x) = -1$

b. $\lim\limits_{x \to 2^-} f(x) = 4$

c. $\lim\limits_{x \to 2} f(x) = DNE$
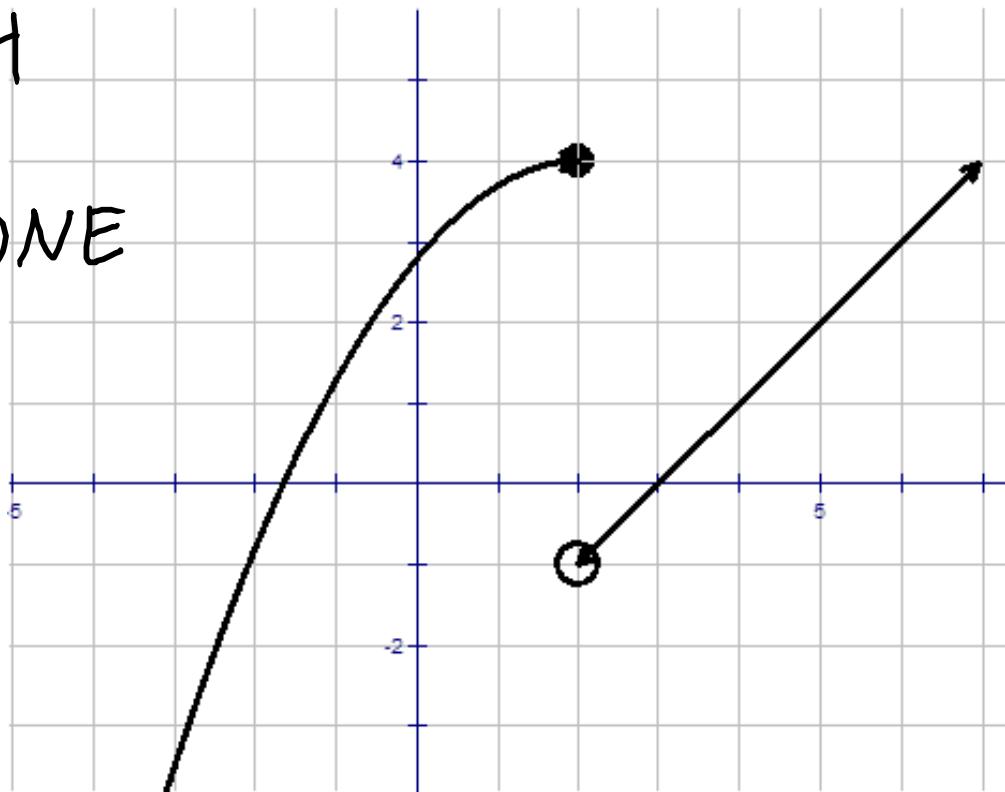
Ex. Find $\lim\limits_{x \to 1} f(x)$ if $f(x) = \begin{cases} 5x - 2, & x < 1 \\ 2x + 1, & x > 1 \end{cases}$

$$\lim\limits_{x \to 1^+} f(x) = \lim\limits_{x \to 1^+} (2x+1) = 3$$

$$\lim\limits_{x \to 1^-} f(x) = \lim\limits_{x \to 1^-} (5x-2) = 3$$

$$\lim\limits_{x \to 1} f(x) = 3$$

x	10	10.9	10.99	10.999	11.001	11.01	11.1	12
$f(x)$	29	31.7	31.97	31.997	32.003	32.03	32.3	35

The table above gives values of the function f at selected values of x. Which of the following conclusions is supported by the data in the table?

$$\frac{11}{19}$$

(A) $\lim\limits_{x \to 11} f(x) = 32$

(B) $\lim\limits_{x \to 11} f(x) = \infty$

(C) $\lim\limits_{x \to 32} f(x) = 11$

(D) $\lim\limits_{x \to 32} f(x) = \infty$
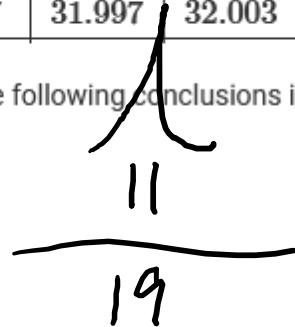
x	2	2.9	2.99	2.999	3.001	3.01	3.1	4
$f(x)$	-8	-80	-800	-8000	8000	800	80	8

The table above gives values of a function f at selected values of x. Which of the following conclusions is supported by the data in the table?

A $\quad \lim\limits_{x \to 3} f(x) = 0$

B $\quad \lim\limits_{x \to 3} f(x) = 3$

C $\quad \lim\limits_{x \to 3} f(x) = 10$

D $\quad \lim\limits_{x \to 3} f(x)$ does not exist.

x	1	1.9	1.99	1.999	1.9999	2.0001	2.001	2.01	2.1	3
$f(x)$	-4	-1.399	-1.040	-1.004	-1.000	6.001	6.012	6.121	7.261	25

The table above gives values of the function f at selected values of x. Which of the following conclusions is supported by the data in the table?

A $\lim_{x \to 2} f(x) = -1$

B $\lim_{x \to 2} f(x) = 6$

C $\lim_{x \to 2^-} f(x) = -1$ and $\lim_{x \to 2^+} f(x) = 6$

D $\lim_{x \to 2^-} f(x) = 6$ and $\lim_{x \to 2^+} f(x) = -1$