One Sided Limits and One Sided Limits Notation

Name ______________________

Date ____________ Period ____

Finding the Limit of a function is finding the value of a function, $f(x)$, as x approaches a specific value, c.

$$\lim_{x \to c} f(x) = L$$

x approaches c from Left Side

$x < c$

$$\lim_{x \to c^-} f(x) = L$$

"The limit of $f(x)$ as x approaches c from the left side"

x approaches c from Right Side

$x > c$

$$\lim_{x \to c^+} f(x) = L$$

"The limit of $f(x)$ as x approaches c from the right side"

$$f(x) = \frac{x^3 - 1}{x - 1}, \quad x \neq 1$$

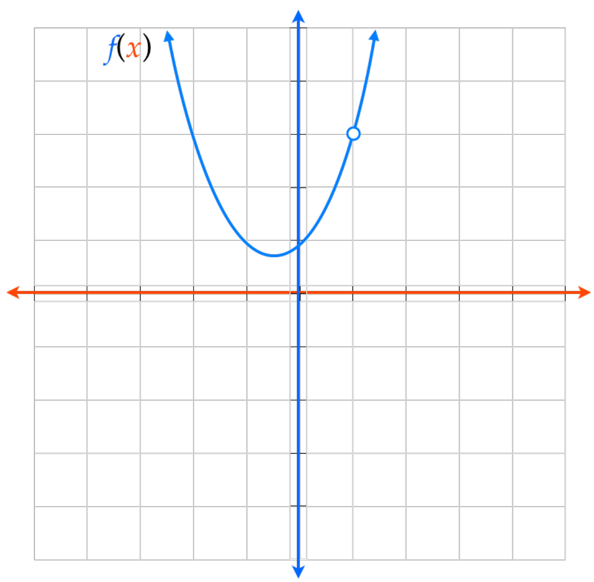
$$\lim_{x \to 1^-} f(x)$$

"The limit of $f(x)$ as x approaches 1 from the left side"

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

"The limit of $f(x)$ as x approaches 1 from the right side"

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



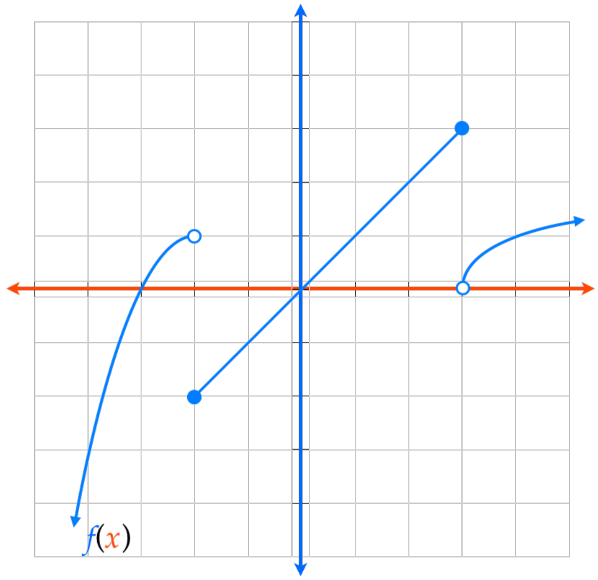
$$f(x) = \begin{cases} -x^2 - 4x - 3, & x < -2 \\ x, & -2 \le x \le 3 \\ \sqrt{x-3}\ , & x > 3 \end{cases}$$

$\lim\limits_{x \to -2^-} f(x)$

"The limit of $f(x)$ as x approaches -2 from the left side"

$\lim\limits_{x \to -2^+} f(x)$

"The limit of $f(x)$ as x approaches -2 from the right side"



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

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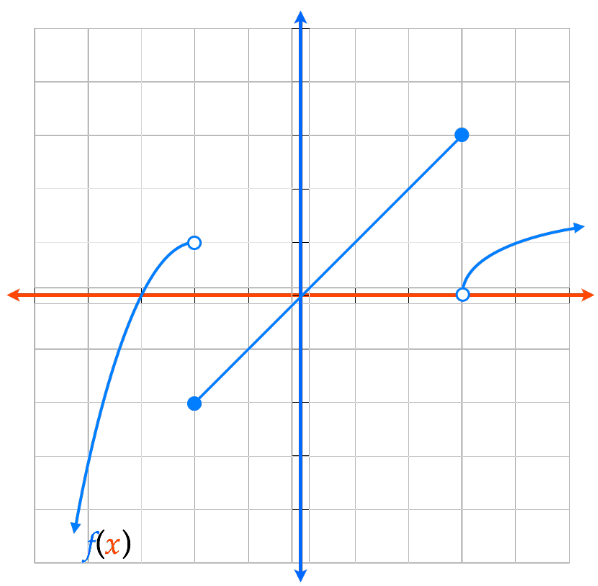


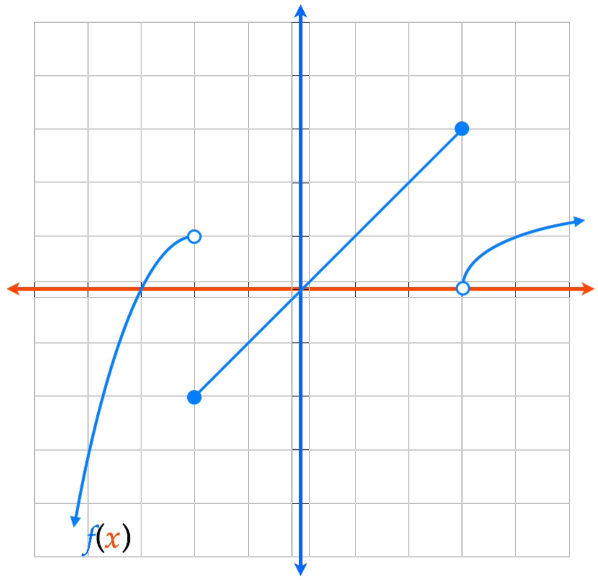
$$f(x) = \begin{cases} -x^2 - 4x - 3, & x < -2 \\ x, & -2 \le x \le 3 \\ \sqrt{x-3}\,, & x > 3 \end{cases}$$

$$\lim_{x \to 3^-} f(x)$$

"The limit of $f(x)$ as x approaches 3 from the left side"

$$\lim_{x \to 3^+} f(x)$$

"The limit of $f(x)$ as x approaches 3 from the right side"



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$$\lim_{x \to c} f(x) = L$$

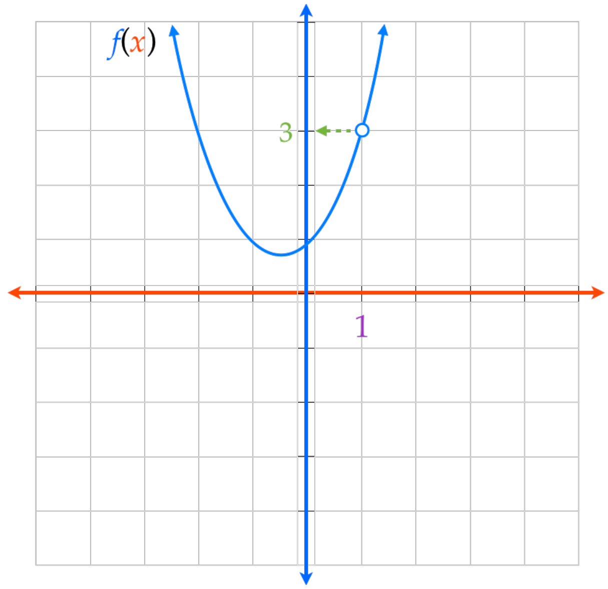
if and only if…

$$\lim_{x \to c^-} f(x) = L \quad \text{and} \quad \lim_{x \to c^+} f(x) = L$$

$$f(x) = \frac{x^3 - 1}{x - 1}, \quad x \neq 1$$

$$\lim_{x \to 1^-} f(x) = 3 \qquad \lim_{x \to 1^+} f(x) = 3$$

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



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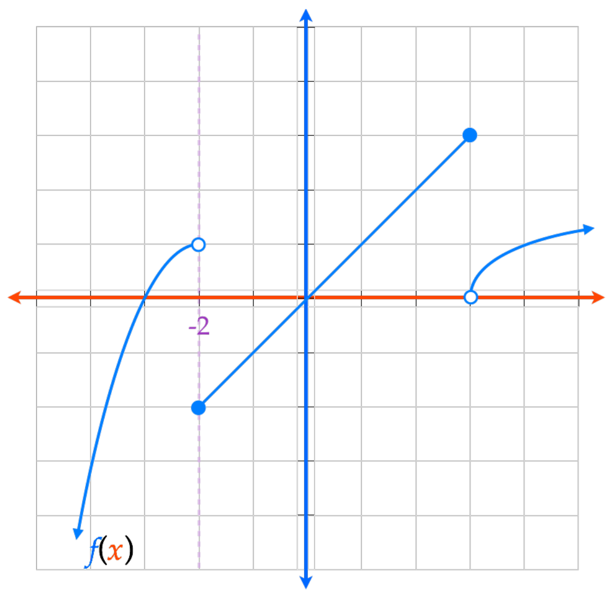
$$\lim_{x \to -2^-} f(x) = 1 \qquad \lim_{x \to -2^+} f(x) = -2$$

$\lim_{x \to -2} f(x)$ does not exist (DNE)



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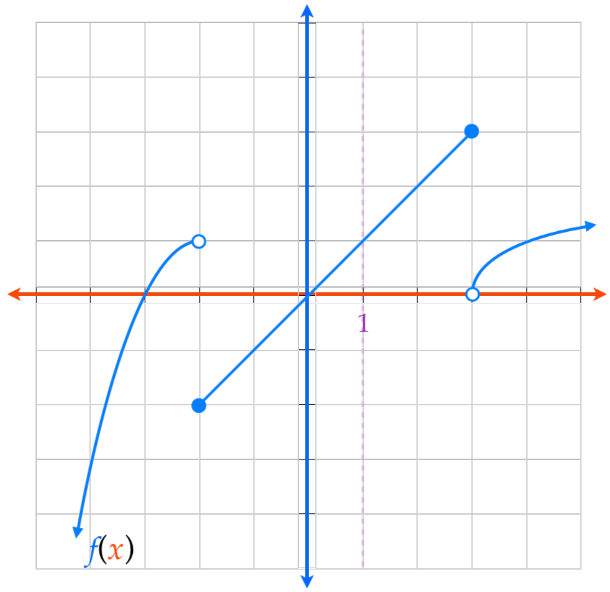
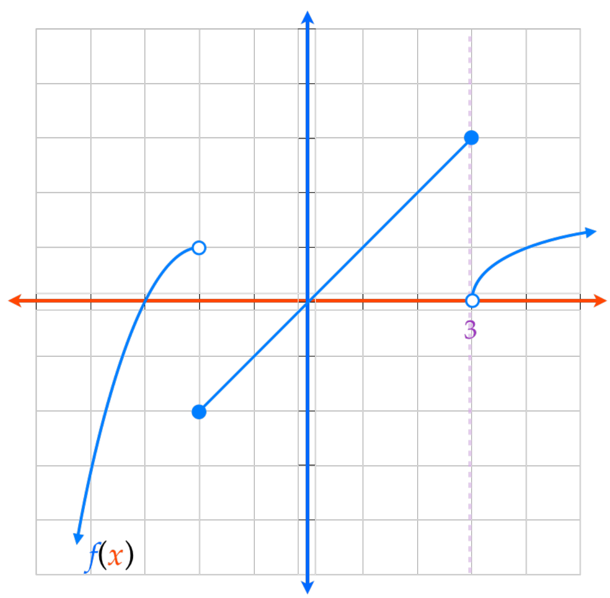


$$f(x) = \begin{cases} -x^2 - 4x - 3, & x < -2 \\ x, & -2 \le x \le 3 \\ \sqrt{x-3}\,, & x > 3 \end{cases}$$

$$\lim_{x \to 3^-} f(x) = 3 \qquad \lim_{x \to 3^+} f(x) = 0$$

$\lim_{x \to 3} f(x)$ does not exist (DNE)



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