

Limits & Continuity

1.3A – One Sided Limits & Graphing

A: Translate into words:

#1)

$$x \rightarrow 10^-$$

$$x \rightarrow -10$$

$$x \rightarrow -10^-$$

B: Find each limit by substitution.

$$\#2) f(x) = \begin{cases} x + 6 & \text{if } x \leq 2 \\ 2x - 5 & \text{if } x > 2 \end{cases}$$

a. $\lim_{x \rightarrow 2^-} f(x)$

b. $\lim_{x \rightarrow 2^+} f(x)$

c. $\lim_{x \rightarrow 2} f(x)$

$$\#3) f(x) = \begin{cases} -3x + 6 & \text{if } x \leq 0 \\ 2x + 6 & \text{if } x > 0 \end{cases}$$

a. $\lim_{x \rightarrow 0^-} f(x)$

b. $\lim_{x \rightarrow 0^+} f(x)$

c. $\lim_{x \rightarrow 0} f(x)$

B: Find each limit.

$$\#4) f(x) = |x|$$

a. $\lim_{x \rightarrow 0^-} f(x)$

b. $\lim_{x \rightarrow 0^+} f(x)$

c. $\lim_{x \rightarrow 0} f(x)$

$$\#5) f(x) = \frac{|x|}{x}$$

a. $\lim_{x \rightarrow 0^-} f(x)$

b. $\lim_{x \rightarrow 0^+} f(x)$

c. $\lim_{x \rightarrow 0} f(x)$

$$\#6) f(x) = \frac{-x}{|x|}$$

a. $\lim_{x \rightarrow 0^-} f(x)$

b. $\lim_{x \rightarrow 0^+} f(x)$

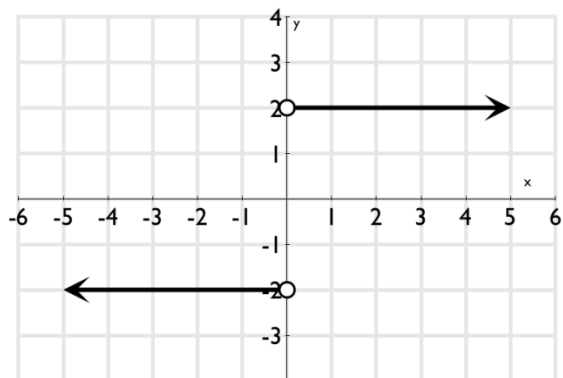
c. $\lim_{x \rightarrow 0} f(x)$

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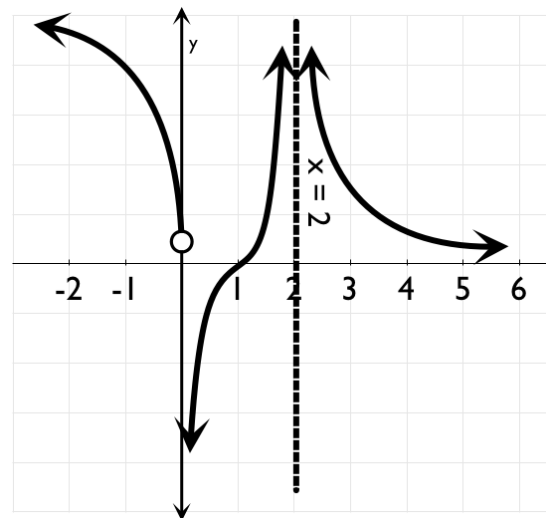
C: Find each limit.

#7)



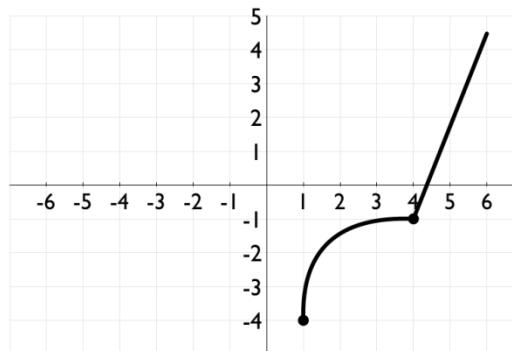
- $\lim_{x \rightarrow 2^-} f(x)$
- $\lim_{x \rightarrow 2^+} f(x)$
- $\lim_{x \rightarrow 2} f(x)$

#8)



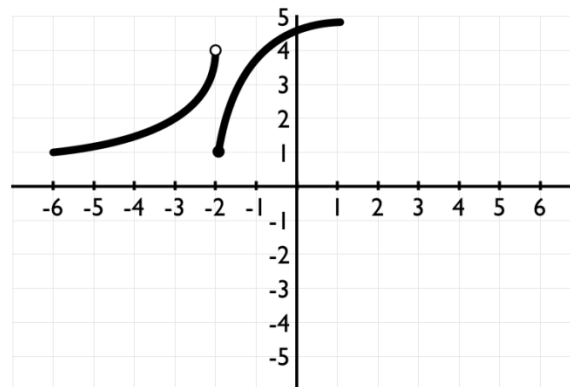
- $\lim_{x \rightarrow 2^-} f(x)$
- $\lim_{x \rightarrow 2^+} f(x)$
- $\lim_{x \rightarrow 2} f(x)$

#9)



- $\lim_{x \rightarrow 4^-} f(x)$
- $\lim_{x \rightarrow 4^+} f(x)$
- $\lim_{x \rightarrow 4} f(x)$

#10)



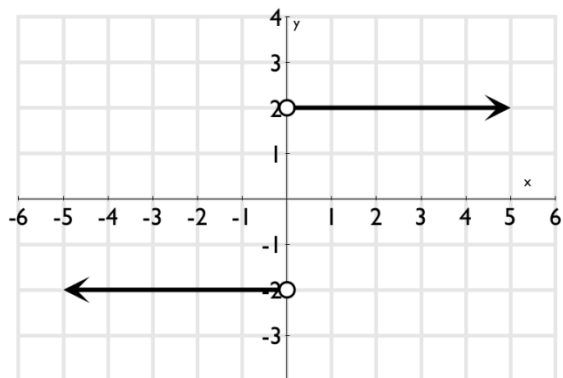
- $\lim_{x \rightarrow -2^-} f(x)$
- $\lim_{x \rightarrow -2^+} f(x)$
- $\lim_{x \rightarrow -2} f(x)$

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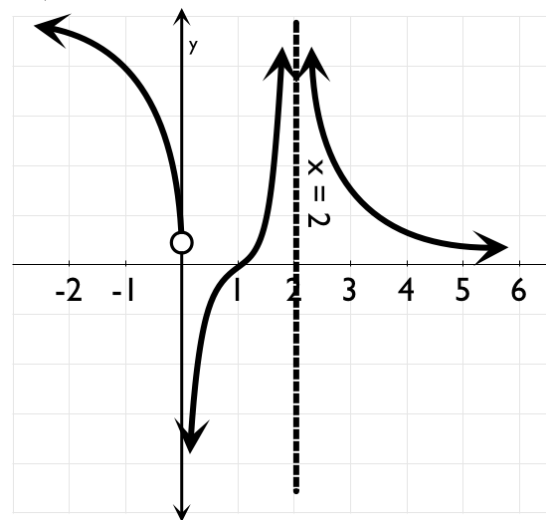
C: Find each limit.

#11)



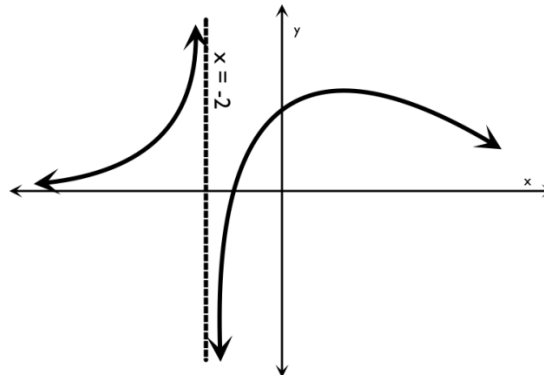
- a. $\lim_{x \rightarrow 0^-} f(x)$
- b. $\lim_{x \rightarrow 0^+} f(x)$
- c. $\lim_{x \rightarrow 0} f(x)$

#12)



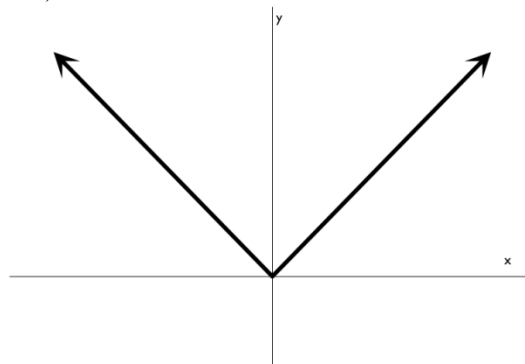
- a. $\lim_{x \rightarrow 0^-} f(x)$
- b. $\lim_{x \rightarrow 0^+} f(x)$
- c. $\lim_{x \rightarrow 0} f(x)$

#13)



- a. $\lim_{x \rightarrow -2^-} f(x)$
- b. $\lim_{x \rightarrow -2^+} f(x)$
- c. $\lim_{x \rightarrow -2} f(x)$

#14)



- a. $\lim_{x \rightarrow 0^-} f(x)$
- b. $\lim_{x \rightarrow 0^+} f(x)$
- c. $\lim_{x \rightarrow 0} f(x)$

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D: Draw each graph by hand. Find the limit as x approaches 3 from the left and from the right. Find the two sided limit.

$$\#15) f(x) = \begin{cases} x & \text{if } x < 3 \\ x - 6 & \text{if } x \geq 3 \end{cases}$$

$$\#17) f(x) = \begin{cases} \frac{1}{3}x + 27 & \text{if } x < 3 \\ x - 1 & \text{if } x \geq 3 \end{cases}$$

$$\#16) f(x) = \begin{cases} 2x + 1 & \text{if } x < 3 \\ -2x - 1 & \text{if } x \geq 3 \end{cases}$$

$$\#18) f(x) = \begin{cases} 2x & \text{if } x < 3 \\ -2x + 12 & \text{if } x \geq 3 \end{cases}$$