1.4 One-Sided Limits

REVIEW: Rewrite each absolute value function as a piecewise function.

a) $y = |x|$

b) $y = |x + 2|$

c) $y = \dfrac{|x|}{x}$

One-Sided Limits

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

Left-Sided Limit

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

Right-Sided Limit

*Use the techniques you learned in 1.2 and 1.3 to find one-sided limits.

ex: Find the limit. If the limit does not exist, explain.

a) $\lim_{x \to 6^-} \left(x^2 - 21\right)$

b) $\lim_{x \to 5^+} \frac{x^2 - 25}{x - 5}$

c) $\lim_{x \to 0^-} \sqrt{x}$

d) $\lim_{x \to 0^+} \ln x$

e) $\lim_{x \to \frac{\pi}{2}^-} \tan x$

ex: Given f(x) find each limit. If the limit does not exist, explain.

$$f(x)=\begin{cases} x^2+4, & x>5 \\ 2x-3, & x\le 5 \end{cases}$$

a) $\lim_{x\to 5} f(x)$

b) $\lim_{x\to 11} f(x)$

ex: Given g(x) find each limit. If the limit does not exist, explain.

$$g(x)=\begin{cases}3, & x>4\\ 2, & x=4\\ x-1, & x<4\end{cases}$$

$$\lim_{x\to 4} g(x)$$

ex: Given h(x) find each limit. If the limit does not exist, explain.

$$h(x)=\begin{cases} x^2-7, & x\neq 3 \\ 1, & x=3 \end{cases}$$

a) $\lim_{x\to 3} h(x)$

b) $\lim_{x\to 0} h(x)$

ex: Find the limit. If the limit does not exist, explain.

a) $\lim_{x \to 6} |x - 6|$

b) $\lim_{x \to 6} \frac{|x - 6|}{x - 6}$

c) $\lim_{x \to -5} \frac{|x+5|}{x-3}$

d) $\lim_{x \to 2} [x]$

e) $\lim_{x \to 2.3} [x]$

f) $\lim_{x \to -2^+} [x]$

g) $\lim_{x \to 3^-} -[5x+6]$