

Activity Score: 4/5

Limits and Discontinuity

For which of the following should one use a one-sided limit? In each case, evaluate the one- or two-sided limit.

1. $\lim_{x \rightarrow 0} \sqrt{x}$ - two-sided limit doesn't exist

2. $\lim_{x \rightarrow -1} \frac{1}{x+1}$ - two-sided limit doesn't exist

3. $\lim_{x \rightarrow 1} \frac{1}{(x-1)^4}$ - two-sided limit exist

4. $\lim_{x \rightarrow 0} |\sin x|$ - two-sided limit exist

5. $\lim_{x \rightarrow 0} \frac{|x|}{x}$ - two-sided limit doesn't exist

Answer

✓ ① $\lim_{x \rightarrow 0^-} \sqrt{x}$ = does not exist

$\lim_{x \rightarrow 0^+} \sqrt{x} = 0$

✓ ④ $\lim_{x \rightarrow 0^-} |\sin x| = 0$

$\lim_{x \rightarrow 0^+} |\sin x| = 0$

✓ ② $\lim_{x \rightarrow -1^-} \frac{1}{x+1} = -\infty$

$\lim_{x \rightarrow -1^+} \frac{1}{x+1} = \infty$

✓ ⑤ $\lim_{x \rightarrow 0^-} \frac{|x|}{x} = -1$

$\lim_{x \rightarrow 0^+} \frac{|x|}{x} = 1$

X ③ $\lim_{x \rightarrow 1^-} \frac{1}{(x-1)^4} = \frac{1}{16}$

$\lim_{x \rightarrow 1^+} \frac{1}{(x-1)^4} = \frac{1}{16}$

$\lim_{x \rightarrow 1} \frac{1}{(x-1)^4} = \infty$

MIT OpenCourseWare
<http://ocw.mit.edu>

18.01SC Single Variable Calculus
Fall 2010

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.