

## Exercise 31

For the following exercises, consider the function  $f(x) = \frac{x^2-1}{|x^2-1|}$ .

What do your results in the preceding exercise indicate about the two-sided limit  $\lim_{x \rightarrow 1} f(x)$ ? Explain your response.

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### Solution

As  $x$  goes to 1 from lesser values, the limit is  $-1$ ; however, as  $x$  goes to 1 from larger values, the limit is  $+1$ . Because the left- and right-handed limits are unequal, the limit of  $f(x)$  as  $x \rightarrow 1$  does not exist. This is apparent from the graph of  $f(x)$  versus  $x$  shown below.

