

## Jump Discontinuity

A *jump* discontinuity occurs when the right-hand and left-hand limits exist but are not equal. We've already seen one example of a function with a jump discontinuity:

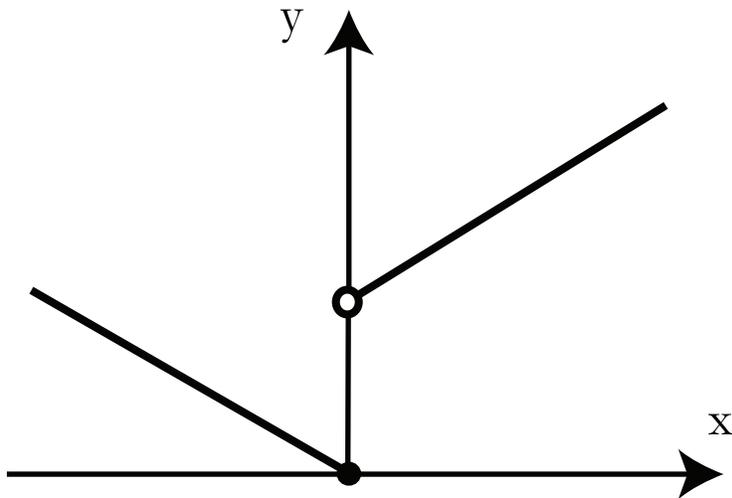


Figure 1: Graph of the discontinuous function listed below

$$f(x) = \begin{cases} x + 1 & x > 0 \\ -x & x \geq 0 \end{cases}$$

This *discontinuous* function is seen in Fig. 1. For  $x > 0$ ,

$$\lim_{x \rightarrow 0} f(x) = 1$$

but  $f(0) = 0$ . (One can also say,  $f$  is continuous from the left at 0, but not the right.)

Here is another example in which  $\lim_{x \rightarrow x_0^+}$  exists, and  $\lim_{x \rightarrow x_0^-}$  also exists, but they are NOT equal.

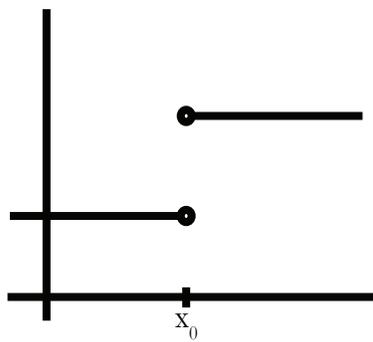


Figure 2: Another example of a jump discontinuity

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>.