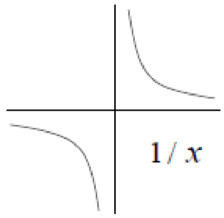
Continuity Facts … Set 3

We say a function is **continuous** if its *domain is an interval*, and it is continuous at every point of that interval.

A **point of discontinuity** is always understood to be isolated, i.e., it is the only bad point for the function on some interval.



The function $1/x$ is continuous on $(0, \infty)$ and on $(-\infty, 0)$, i.e., for $x > 0$ and for $x < 0$, in other words, at every point in its domain. However, it is not a continuous function since its domain is not an interval. It has a single point of discontinuity, namely $x = 0$, and it has an infinite discontinuity there.

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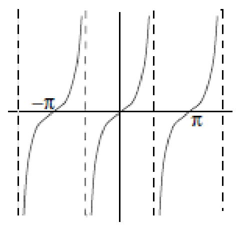
We illustrate the point of these definitions. (They are slightly different from the ones in your book, but are more consistent with standard terminology in calculus.)



The function $\tan x$ is not continuous, but is continuous on for example the interval $-\pi/2 < x < \pi/2$. It has infinitely many points of discontinuity, at $\pm\pi/2, \pm3\pi/2$, etc.; all are infinite discontinuities.

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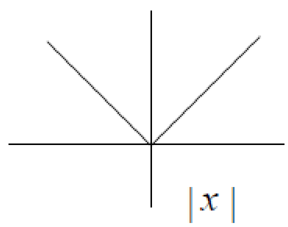

$f(x) = |x|$ is continuous.

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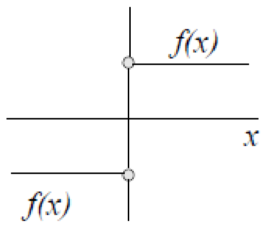

$$f(x) = \begin{cases} 1, & x > 0, \\ -1, & x < 0 \end{cases}$$

$f(x)$ discontinuous at 0.

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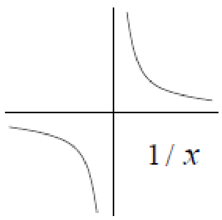
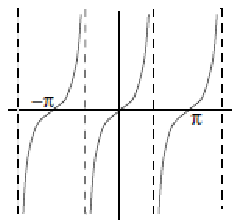


Example



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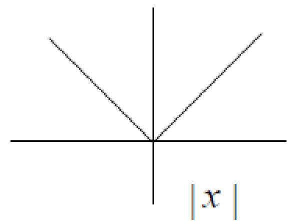

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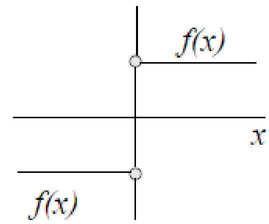

Example