

Suppose the function  $f$  is defined on an open interval containing the number  $c$ , but  $f$  need not be defined at  $c$ . If  $f(x)$  can be made arbitrarily close to the number  $L$  by choosing  $x$  sufficiently close to, but different from,  $c$  then we say  $f(x)$  approaches  $L$  as  $x$  approaches  $c$ . We write

$$\lim_{x \rightarrow c} f(x) = L.$$

## Common ways limits fail to exist

- The limit from the left does not equal the limit from the right
- The function values grow without bound as the limit point is approached
- The function values continually oscillate between two different fixed values
- The function is not defined on an open interval containing the limit point