

What is a limit?

Limits are behaviors, as  $x$  approaches some number the limit is what  $y$  is doing.

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

Look at  $(c, L)$  & see what is going on.

What must be true for a limit to exist?

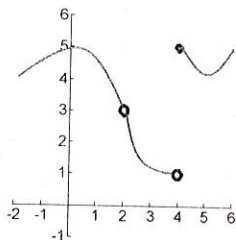
For a limit to exist:

the right handed limit must equal the left handed limit

$$\lim_{x \rightarrow c^+} f(x) = \lim_{x \rightarrow c^-} f(x)$$

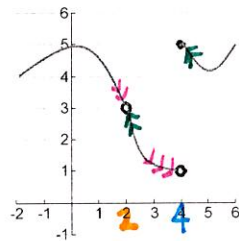
Use the given graph  $f$  to state the value of each quantity, if it exists. If it does not exist, explain why.

- A.)  $\lim_{x \rightarrow 4^-} f(x)$  D.)  $f(4)$   
 B.)  $\lim_{x \rightarrow 4^+} f(x)$  E.)  $\lim_{x \rightarrow 2} f(x)$   
 C.)  $\lim_{x \rightarrow 4} f(x)$  F.)  $f(2)$



Use the given graph  $f$  to state the value of each quantity, if it exists. If it does not exist, explain why.

- A.)  $\lim_{x \rightarrow 4^-} f(x)$  1 D.)  $f(4)$  5  
 B.)  $\lim_{x \rightarrow 4^+} f(x)$  5 E.)  $\lim_{x \rightarrow 2} f(x)$  3  
 C.)  $\lim_{x \rightarrow 4} f(x)$  does not exist F.)  $f(2)$  undefined



Find the limit  
using the table.

$$\lim_{x \rightarrow -1} h(x) =$$

$$\lim_{x \rightarrow -1} p(x) =$$

$$\lim_{x \rightarrow -1} r(x) =$$

$x$	1.1	1.003	1.0001	0.9999	0.8762	0.6522
$h(x)$	89	677	5009	2.003	2.088	2.113
$p(x)$	16.222	16.111	16.002	15.999	15.802	15.777
$r(x)$	-99	-999	-9999	-8853	-871	-86

left-sided limit  $\swarrow$  -1  $\nwarrow$  Right-sided limit

$$\lim_{x \rightarrow -1} h(x) = \text{does not exist}$$

$$\lim_{x \rightarrow -1} p(x) = 16$$

$$\lim_{x \rightarrow -1} r(x) = -\infty$$

$x$	-1.1	-1.003	-1.0001	-0.9999	-0.8762	-0.6522
$h(x)$	89	677	5009	2.003	2.088	2.113
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