

Continuous Functions

A function is continuous in $[a,b]$ only if each condition is met:

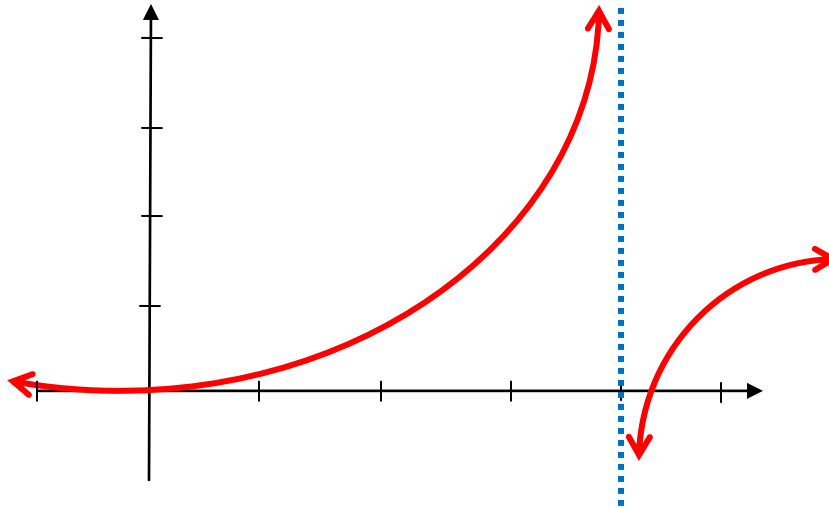
1. For each value of c where $a \leq c \leq b$, $f(c)$ exists.

2. $\lim_{x \rightarrow c} f(x)$ exists

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

Examples:

1.



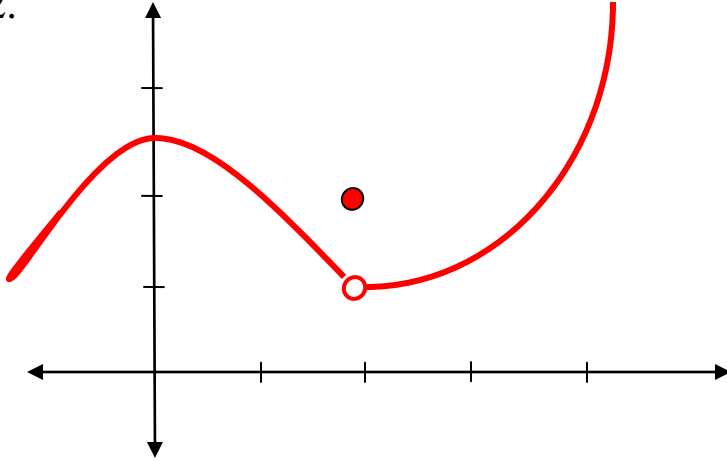
What is happening here?

$f(x)$ is continuous in $[-1,3]$. It is not continuous in $[-1,5]$ because $c = 4$ is in $[-1,5]$.

$f(4)$ does not exist and $\lim_{x \rightarrow 4} f(x)$ does not exist.

\therefore All 3 conditions for continuity have failed.

2.

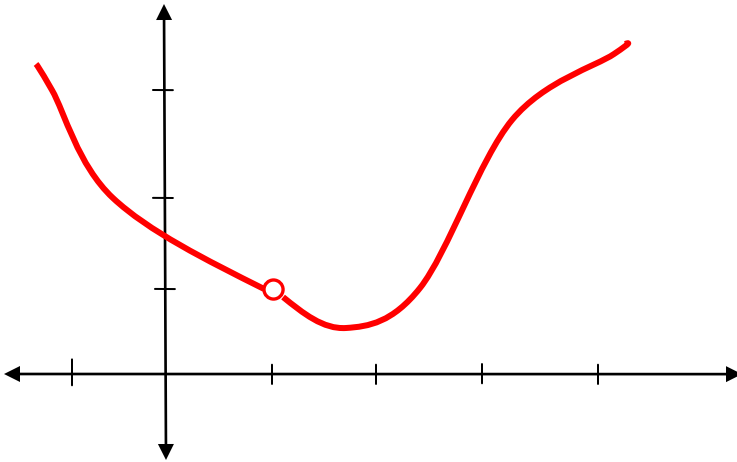


What is happening here?

$g(x)$ is continuous in $[-1,1]$ but it is not continuous in $[-1,4]$. At $c = 2$, $f(2) = 2$ and the $\lim_{x \rightarrow 2} f(x) = 1$.

\therefore **Condition #3 for continuity has failed.**

3.



What is happening here?

$h(x)$ is continuous $(-\infty,1)$ and $(1,\infty)$.

$h(x)$ is not continuous in $[-1,4]$ because at $c = 1$, $f(c)$ does not exist.

\therefore **Condition #1,#3 for continuity has failed.**

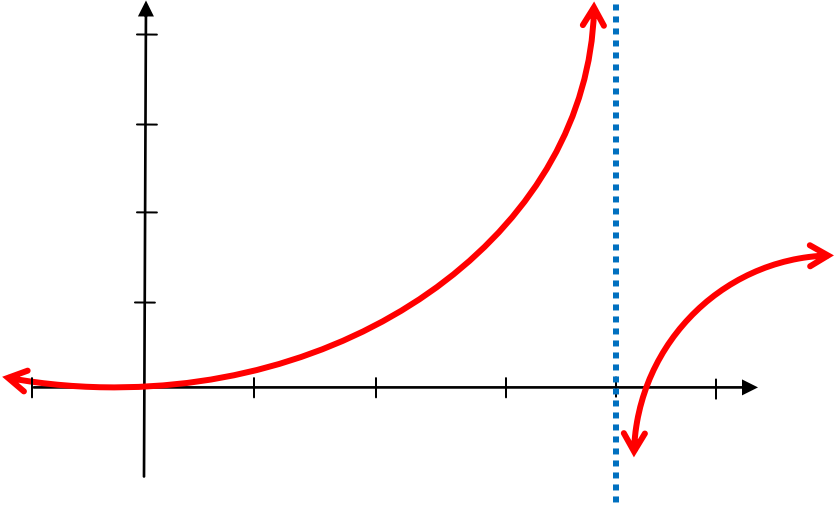
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A function is continuous in $[a,b]$ only if each condition is met:

- 1. _____.
- 2. _____.
- 3. _____.

Examples:

1.



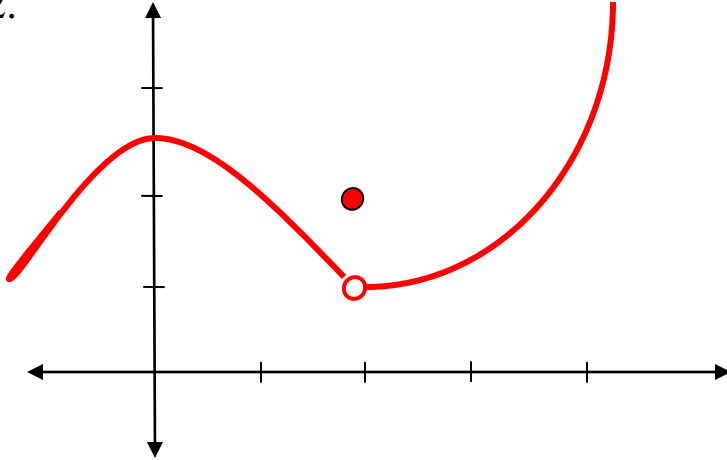
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\therefore _____.

2.



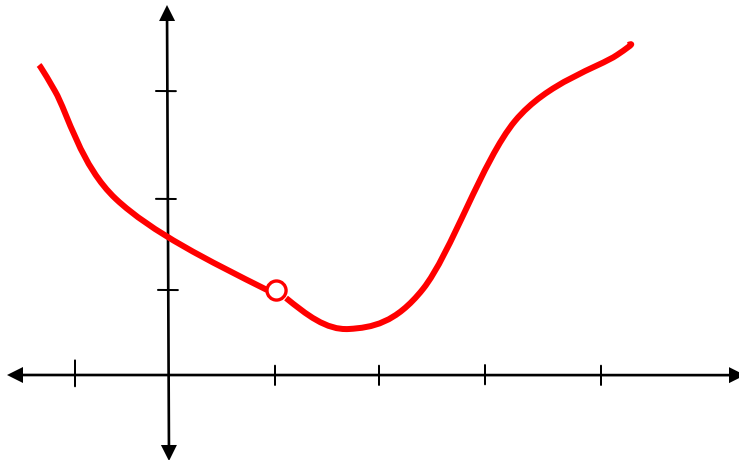
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\therefore _____.