

Complete each statement by choosing one of the four phrases from the box below. Phrases may be used more than once. Unless otherwise specified, assume each function is defined and continuous for all real numbers.

the absolute (global) maximum	the absolute (global) minimum
a local (relative) maximum	a local (relative) minimum

1. A function f defined and continuous on the interval $-2 \leq x \leq 5$ has critical points (or critical numbers) only at $x = -1$ and $x = 2$. The function f has values as given in the table below.

x	$f(x)$
-2	1
-1	2
2	0
5	2

The value $x = 2$ locates _____ value of the function. The value $f(x) = 2$ is _____ value of the function.

2. If $x = 2$ is the only critical point of a function f and $f''(2) < 0$, then $x = 2$ locates _____ value of the function.
3. If $f'(2) = 0$ and $f'(x)$ changes from negative to positive at $x = 2$, then $x = 2$ locates _____ value of the function f .
4. If $f'(2) = 0$ and $f''(2) > 0$, then $x = 2$ locates _____ value of the function f .
5. If $x = 2$ is a critical point of the function f , and $f'(x)$ decreases through $x = 2$, then $x = 2$ locates _____ value of the function.
6. If a continuous function f increases throughout a closed interval, then the left endpoint of the graph of f on the interval is _____ point of the function.

7. A student found the critical points of a function f to be $x = 2$ and $x = 4$, and produced the chart below.

Interval	$x < 2$	$2 < x < 4$	$x > 4$
$f'(x)$	positive	negative	positive

The value $x = 2$ locates _____ value of the function.

8. If $x = 2$ is the only critical point of a function f and $f''(2) = 3$, then $x = 2$ locates a _____ value of the function.

Classifying Critical Points Solutions

Note that critical points also are referred to in some texts as *critical numbers* or *critical values*. They are values of x at which a function f satisfies $f'(x) = 0$ or at which $f'(x)$ is not defined (does not exist).

1. the absolute (global) minimum, the absolute (global) maximum
One also can say, "The value $x = 2$ locates, or is the x -coordinate of, the absolute (global) minimum point of the graph of the function." Note that the graph of f has two absolute (global) maximum points, $(-1, 2)$ and $(5, 2)$, but just one absolute (global) maximum value, $f(-1) = 2 = f(5)$.
2. the absolute (global) maximum
3. a local (relative) minimum
4. a local (relative) minimum
5. a local (relative) maximum
6. the absolute (global) minimum
One also can say, "The left endpoint of the interval locates the absolute (global) minimum value of the function," or "The left endpoint of the interval locates, or is the x -coordinate of, the absolute minimum point of the graph of the function."
7. a local (relative) maximum
8. the absolute (global) minimum