Worksheet 2: Classifying Critical Points, Part II

Determine if each of the following statements is true or false. If you decide a statement is false, provide a counterexample to show why it is false and then rewrite the statement in order to make it true. Unless otherwise specified, assume each function is defined and continuous for all real numbers.

1. A critical point (or critical number) of a function f of a variable x is the x-coordinate of a relative maximum or minimum value of the function.
2. A continuous function on a closed interval can have only one maximum value.
3. If $f''(x)$ is always positive, then the function f must have a relative minimum value.
4. If a function f has a local minimum value at $x = \mathrm{c}$, then $f'(c) = 0$.
5. If $f'(2) = 0$ and $f''(2) < 0$, then $x = 2$ locates a relative maximum value of f.
6. If $f''(2) < 0$, then $x = c$ is a point of inflection for the function f and cannot be the x-coordinate of a maximum or minimum point on the graph of f.
7. If a function f is defined on a closed interval and $f'(x) > 0$ for all x in the interval, then the absolute maximum value of the function will occur at the right endpoint of the interval.
8. The absolute minimum value of a continuous function on a closed interval can occur at only one point.
9. If $x = 2$ is the only critical point of a function f and $f''(2) > 0$, then $f(2)$ is the minimum value of the function.
10. To locate the absolute extrema of a continuous function on a closed interval, you need only compare the y-values of all critical points.
11. If $f'(c) = 0$ and $f'(x)$ decreases through $x = c$, then $x = c$ locates a local minimum value for the function.
12. Absolute extrema of a continuous function on a closed interval can occur only at endpoints or critical points.