Analysis of Functions True/False Quiz

Classify each claim as TRUE or FALSE, and explain why. “True” means that the statement is always true, while “False” means that even if it might sometimes be true, it is not always true. You can explain why something is false with a single counter-example, but examples are not sufficient to explain why something is true.

1. If $f$ has a relative extremum at $x = c$, then $f'(c) = 0$.

2. If $f'(c) = 0$, then $f$ has a relative extremum at $x = c$.

3. If $f$ is not differentiable at $x = c$, then $f$ has a relative extremum at $x = c$.

4. If $f$ is defined everywhere and has a relative extremum at $x = c$, then $c$ is a critical number.

5. If $f$ has an inflection point at $x = c$, then $f''(c) = 0$.

6. If $f''(c) = 0$, then $f$ has an inflection point at $x = c$.

7. If $f$ is concave up for $x < c$ and concave down for $x > c$, then $f$ has an inflection point at $x = c$.

8. If $f'(c)$ is undefined, then $f$ cannot have an inflection point at $x = c$.

9. If $f$ is differentiable and $f'$ has a relative extremum at $x = c$, then $f$ has an inflection point at $x = c$.

10. If $f$ has an inflection point at $x = c$, then $f'$ has a relative extremum at $x = c$. 