EMCF 19

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All of the questions below refer to the function \( f \).

The graph of the derivative of \( f \) is shown below.

1. Give the number of critical numbers of \( f \).
   a. 3
   b. 4
   c. 5
   d. 6
   e. 7
   f. None of these.
2. **Give the number of values of** $x$ **where** $f$ **has a local maximum.**
   a. 0
   b. 1
   c. 2
   d. 3
   e. 4
   f. None of these.

3. **Give the number of values of** $x$ **where** $f$ **has a local minimum.**
   a. 0
   b. 1
   c. 2
   d. 3
   e. 4
   f. None of these.

4. **Which of the following is true?**
   a. $x = a$ is not a critical number for $f$
   b. $x = a$ is a critical number for $f$ and $f$ has a local minimum at $x = a$.
   c. $x = a$ is a critical number for $f$ and $f$ has a local maximum at $x = a$.
   d. $x = a$ is a critical number for $f$, but $f$ has neither a local maximum nor a local minimum at $x = a$.
   e. None of these.

5. **Which of the following is true?**
   a. $x = b$ is not a critical number for $f$
   b. $x = b$ is a critical number for $f$ and $f$ has a local minimum at $x = b$.
   c. $x = b$ is a critical number for $f$ and $f$ has a local maximum at $x = b$.
   d. $x = b$ is a critical number for $f$, but $f$ has neither a local maximum nor a local minimum at $x = b$.
   e. None of these.

6. **Which of the following is true?**
   a. $x = c$ is not a critical number for $f$
   b. $x = c$ is a critical number for $f$ and $f$ has a local minimum at $x = c$.
   c. $x = c$ is a critical number for $f$ and $f$ has a local maximum at $x = c$.
   d. $x = c$ is a critical number for $f$, but $f$ has neither a local maximum nor a local minimum at $x = c$.
   e. None of these.

7. **Which of the following is true?**
   a. $x = d$ is not a critical number for $f$
   b. $x = d$ is a critical number for $f$ and $f$ has a local minimum at $x = d$.
   c. $x = d$ is a critical number for $f$ and $f$ has a local maximum at $x = d$.
   d. $x = d$ is a critical number for $f$, but $f$ has neither a local maximum nor a local minimum at $x = d$.
   e. None of these.
8. Which of the following is true?
   a. $x = e$ is not a critical number for $f$
   b. $x = e$ is a critical number for $f$ and $f$ has a local minimum at $x = e$.
   c. $x = e$ is a critical number for $f$ and $f$ has a local maximum at $x = e$.
   d. $x = e$ is a critical number for $f$, but $f$ has neither a local maximum nor a local minimum at $x = e$.
   e. None of these.

9. Which of the following is true?
   a. $x = h$ is not a critical number for $f$
   b. $x = h$ is a critical number for $f$ and $f$ has a local minimum at $x = h$.
   c. $x = h$ is a critical number for $f$ and $f$ has a local maximum at $x = h$.
   d. $x = h$ is a critical number for $f$, but $f$ has neither a local maximum nor a local minimum at $x = h$.
   e. None of these.

10. Which of the following is true?
    a. $x = g$ is not a critical number for $f$
    b. $x = g$ is a critical number for $f$ and $f$ has a local minimum at $x = g$.
    c. $x = g$ is a critical number for $f$ and $f$ has a local maximum at $x = g$.
    d. $x = g$ is a critical number for $f$, but $f$ has neither a local maximum nor a local minimum at $x = g$.
    e. None of these