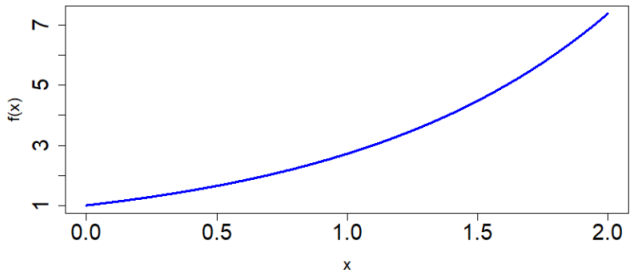
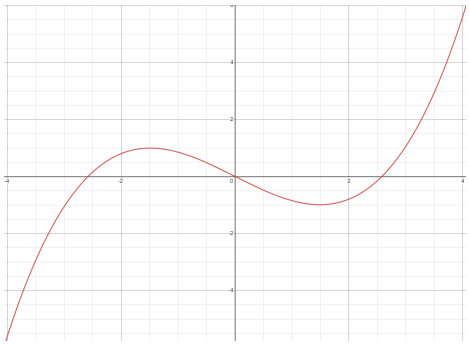
Lecture 3 - Practice Questions

1. Consider the function below defined in the interval $[0, 2]$. How many critical points does it have ?



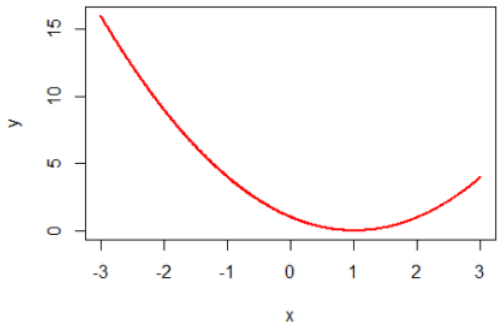
   A. 0
   B. 1
   C. 2
   D. 3

2. Consider the continuous function $f : [-4, 4] \to \mathbb{R}$ plotted below. In how many points is the derivative equal to zero?



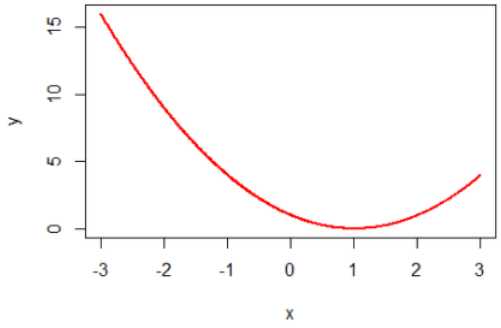
   A. 0
   B. 1
   C. 2
   D. None of the others

3. Consider the function plotted below. In which of the following intervals is the derivative positive?



A. $[-3, -1]$
B. $[-1, 1]$
C. $[0, 2]$
D. $[2, 3]$

4. Consider the function plotted below. How many critical points does it have?

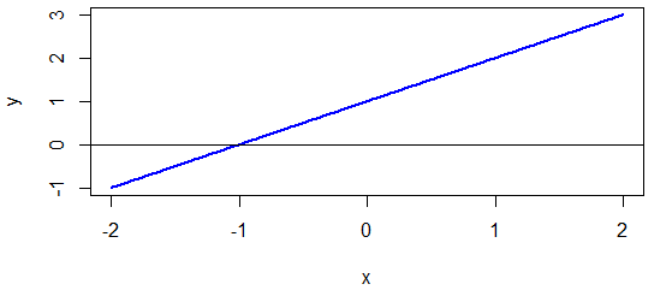


A. 0
B. 1
C. 2
D. 3

5. Let $f : \mathbb{R} \to \mathbb{R}$ be a continuous, differentiable function. Suppose that $f'(x) = 0$ and $f''(x) < 0$. Which of the following statements is correct?
   A. x is a local minimum
   B. x is a local maximum
   C. x is a global minimum
   D. x is a global maximum

6. Suppose 0 is a local minimum for f. Which of the following statements is necessarily correct ?
   A. $f'(0) = 0$
   B. $f'(0) > 0$
   C. $f'(0) < 0$
   D. $f''(0) = 0$

7. Let $f(x)$ be a function such that $f'(x) = 0$ for $x = 0$, i.e. $x = 0$ is a critical point. By looking at the plot of the second derivative $f''(x)$ given below, which of the following statements about $x = 0$ is true?



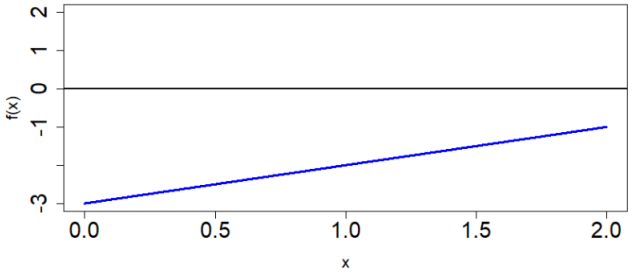
A. It is a local minimum

B. It is a local maximum

C. It is a global maximum

D. It is a global minimum

8. Suppose that a function f, defined in $[0, 2]$, has derivative plotted in blue below. Which of the following statements about f is correct ?



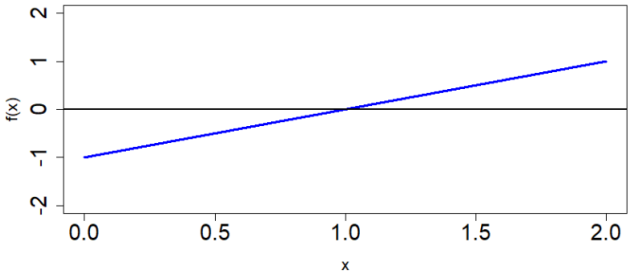
A. It is monotonically increasing

B. It is monotonically decreasing

C. It has one local maximum

D. It has one local minimum

9. Suppose that a function f, defined in $[0, 2]$, has derivative plotted in blue below. Which of the following statements about f is false?



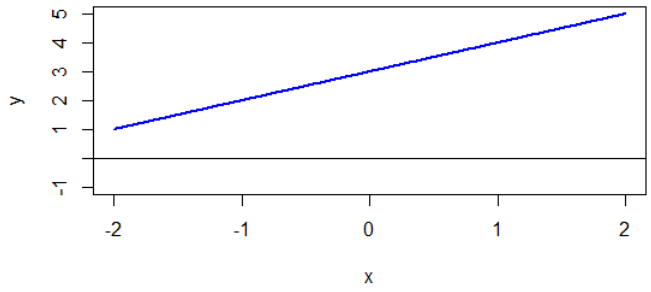
A. The point 1 is a critical point

B. The point 1 has derivative equal to zero

C. The point 1 is a local minimum

D. The point 1 is a global maximum

10. Let $f(x)$ be a function such that its derivative $f'(x)$ is the one reported in the figure below. Which of the following statements about $f(x)$ is true?



A. $f(x)$ is constant

B. $f(x)$ is decreasing

C. $f(x)$ is increasing

D. $f(x)$ is both increasing and decreasing

11. Let f be a continuous function in the interval $[0, 3]$ such that $f'(x) = 0$ only for $x = 1$. Which of the following points cannot be a global maximum for the function f?

A. 0

B. 1

C. 2

D. 3

Question	Correct Answer
1	A
2	C
3	D
4	B
5	B
6	A
7	A
8	B
9	D
10	C
11	C