



Q1) Choose the correct answer

1. Let  $f(x) = x^3 - 3x^2 + 2$ . At which x-value does a local maximum occur?
- $x = 0$
  - $x = 1$
  - $x = 2$
  - No local maximum
2. Let  $f(x) = x^2 - 4x + 5$ . What type of extremum does the function have?
- Local maximum
  - Local minimum
  - Both
  - None
3. Let  $f(x) = x^3 - 6x^2 + 9x$ . How many critical points does the function have?
- 0
  - 1
  - 2
  - 3
4. Let  $f(x) = x^4$ . What happens at  $x = 0$ ?
- Local maximum
  - Local minimum
  - Inflection point
  - No extremum
5. Let  $f(x) = x^3$ . What happens at  $x = 0$ ?
- Local maximum
  - Local minimum
  - Inflection point
  - Absolute maximum
6. Let  $f(x) = -2x^2 + 8x$ . What is the x-value of the maximum point?
- $x = 2$
  - $x = 4$
  - $x = -2$
  - $x = 0$
7. Let  $f(x) = x^4 - 4x^2$ . How many local minima does the function have?
- 0
  - 1
  - 2
  - 3
8. Find the absolute maximum of  $f(x) = -x^2 + 4x$  on  $[0, 4]$ .
- 0
  - 4
  - 8
  - 16
9. Let  $f(x) = x^3 + 3x$ . How many relative extrema does the function have?
- 0
  - 1
  - 2
  - 3
10. Let  $f(x) = x^2 + 1$ . What is the absolute minimum value?
- 0
  - 1
  - 2
  - Does not exist
11. Let  $f(x) = \sin x$  on  $[0, 2\pi]$ . What is the absolute maximum value?
- 0
  - 1
  - $\pi$
  - 2
12. A rectangle has a fixed perimeter. Its area is modeled by a function  $A(x)$ . When is the maximum area achieved?
- When length > width
  - When width > length
  - When length = width
  - When perimeter increases
13. Let  $f(x) = x^3 - 3x$ . At which x-value(s) does the function have local extrema?
- $x = -1$  only
  - $x = 1$  only
  - $x = -1, 1$
  - No extrema
14. Let  $f(x) = x^4 - 2x^2 + 1$ . What is the minimum value of the function?
- 0
  - 1
  - 1
  - Does not exist
15. Let  $f(x) = \cos x$  on  $[0, 2\pi]$ . At which x-value does the absolute minimum occur?
- $x = 0$
  - $x = \pi$
  - $x = 2\pi$
  - $x = \frac{\pi}{2}$