

Question 3**Problem:**

Consider the function $f(x) = x^4 - 4x^3 + 10$ on the interval $[0, 4]$.

- (a) Find the critical points of $f(x)$ on the interval.
- (b) Determine the absolute maximum and minimum values of $f(x)$ on the interval $[0, 4]$.

Question 3 - Solution**(a) Find critical points:**

First, compute the derivative:

$$f'(x) = 4x^3 - 12x^2$$

Factor:

$$f'(x) = 4x^2(x - 3) \Rightarrow f'(x) = 0 \text{ when } x = 0 \text{ or } x = 3$$

Both are within the interval $[0, 4]$, so check both.

(b) Evaluate function at critical points and endpoints:

$$f(0) = 0 - 0 + 10 = 10$$

$$f(3) = 81 - 108 + 10 = -17$$

$$f(4) = 256 - 256 + 10 = 10$$

Conclusion:

- Minimum value: -17 at $x = 3$ - Maximum value: 10 at $x = 0$ and $x = 4$

Graph of the function on $[0, 4]$:

