1. Find all the critical points of the function

\[ f(x) = 1 - 3x + 3x^2 - x^3, \]

and determine whether they are relative maxima, relative minima or horizontal points of inflection.

2. Is the graph of \( y = x^4 - 3x^3 + 2x - 1 \) concave up or down at \( x = 2 \)?

3. Suppose that the total cost function for a product is

\[ C(x) = 3x^2 + 15x + 75 \]

How many units minimize the average cost? Find the minimum average cost.

4. If \( y = e^{3x^2 - 6x^2 + 4x} \), find \( y' \).

5. If \( y = \ln(x^6 + 4x^4 + 2) \), find \( y' \). Does the derivative exist for all values of \( x \).

6. If \( y = \log_5(x^4 + x^2 + 1) \), find \( y' \).

7. If \( y = 4e^x \), find \( y' \).

8. Find \( \frac{dy}{dx} \) if \( x^2 + 2x^3y^2 - y^5 = 0 \).

9. Suppose that \( 3x^2 - 2y^3 = 10y \), where \( x \) and \( y \) are differentiable functions of \( t \). If \( \frac{dx}{dt} = 2 \), find \( \frac{dy}{dt} \) when \( x = 10 \) and \( y = 5 \).