Assignment 9

1. Consider the function f(x) = 2x^2 - 3x + 1. Find the critical points and determine whether they are maxima, minima, or saddle points.

2. A company produces a product with a marginal cost function C'(x) = 0.5x + 4. If the fixed cost is $200, find the total cost function C(x).

3. Solve the following differential equation: dy/dx + 2y = 3e^x. Find the general solution.

4. A particle moves along a curve defined by the equation x^2 + y^2 = 25. At the point (3, 4), find the equation of the tangent line to the curve.

5. A tank contains 100 liters of pure water. A solution containing 0.1 kg of salt per liter enters the tank at a rate of 2 liters per minute. The well-stirred solution leaves the tank at the same rate. Find the amount of salt in the tank after 30 minutes.

6. Find the area under the curve y = x^2 from x = 0 to x = 3.

7. A company produces a product with a demand function p(x) = 100 - 0.5x. The cost function is C(x) = 50x + 200. Find the profit function and determine the price and quantity that maximize profit.

8. A company produces a product with a production function Q = 1000 + 10x - 0.1x^2. If the price is $10 per unit, find the profit function and determine the quantity that maximizes profit.

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