Mathematics Review Course
Summer 2023
Problem Set 09

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Note: [Source] at the start of each problem denotes the source of the question. If there is no source, it is an original problem of my creation.

First Order Conditions

1. Max. $f(x) = log(x^2 + 2x - 3)$.
2. Consider a firm is a monopoly. They have the following revenue function $R(p, Q) = pQ$ with a price of $p = 8 - Q$ subject to a cost function of $c(Q) = \frac{Q}{3}$. Write the profit function and maximize profit to determine the monopoly quantity supplied Q^*.

Lagrangian Method

3. Max $g(a, b) = e^a b^3$ s.t. $2a + b \leq 10$.
4. Max $U(x_1, x_2, x_3) = e^{x_1} x_2^{\alpha} x_3^{\beta}$ s.t. $w \geq p_1 x_1 + p_2 x_2 + p_3 x_3$.