MATH 104: HOMEWORK 6

DUE DATE: IN CLASS – MONDAY, APRIL 15, 2024

Fulbright University, Ho Chi Minh City, Vietnam

Read Stewart's Chapter 14.8 if you need to have more examples.

Problem 1. Each of these extreme value problems has a solution with both a maximum value and a minimum value. Use Lagrange multipliers to find the extreme values of the function subject to the given constraint.

(1) $f(x, y) = x^2 - y^2; \quad x^2 + y^2 = 1$
(2) $f(x, y) = 3x + y; \quad x^2 + y^2 = 10$
(3) $f(x, y) = xy; 4x^2 + y^2 = 8$
(4) $f(x, y) = xe^y; \quad x^2 + y^2 = 2$

Problem 2. Find the extreme values of f subject to both constraints.

(1) $f(x, y, z) = x + y + z; \quad x^2 + z^2 = 2, \quad x + y = 1$
(2) $f(x, y, z) = z; \quad x^2 + y^2 = z^2, \quad x + y + z = 24$

Problem 3. 21-23 Find the extreme values of f on the region described by the inequality.

(1) $f(x, y) = x^2 + y^2 + 4x - 4y, \quad x^2 + y^2 \leqslant 9$
(2) $f(x, y) = 2x^2 + 3y^2 - 4x - 5, \quad x^2 + y^2 \leqslant 16$