

Homework 7

Problem 1. Find the product of the maximal and the minimal values of the function

$$f(x, y) = x - 2y + 2xy$$

in the region

$$(x - 1)^2 + (y + 1/2)^2 \leq 2.$$

Problem 2. Find the maximum of the function $F(x, y, z) = 2x + y - z$ on the surface

$$4x^2 + 2y^2 + z^2 = 40.$$

Problem 3. Find the product of the maximum and minimum values of

$$f(x, y, z) = (x - 2)^2 + (y - 1)^2 + (z + 2)^2$$

on the sphere

$$x^2 + y^2 + z^2 = 1$$

Problem 4. Let

$$f(x, y) = 4x - 8xy + 2y + 1.$$

Find the absolute maxima and absolute minima of f in the domain bounded by the lines $x = 0$, $y = 0$ and $x + y = 1$ in the first quadrant.

Problem 5. Compute the double integral

$$\int_0^1 \int_{ey}^e \frac{e - x}{\ln(x)} dx dy$$