

Department of Mathematics and Statistics

MATH 222: Calculus III

Written Assignment 3

Due in class Monday November 25, 2002

Justify all of your assertions

1. Show that the function $f(x, y) = 3xe^y - x^3 - e^{3y}$ has a unique critical point and that, at this point, the function $f(x, y)$ has a local maximum but not a global maximum.
2. Using Lagrange multipliers, find the maximum and minimum values of the function $f(x, y) = 2x + 3y$ on the curve $x^2 + xy + 2y^2 = 37$.
3. Sketch the domain of integration and then compute

$$\int_0^2 \int_x^2 \frac{\ln y}{\sqrt{y}} dy dx$$

by changing the order of integration.

4. Use cylindrical coordinates to find the volume of the solid that lies between the cylinders $x^2 + y^2 = 1$ and $x^2 + y^2 = 4$, above the xy -plane, and below the plane $z = x + 2$.