

Spring 2009: Math 241 (Section 02); Practice EXAM 3

1. Use the method of Lagrange multipliers to find the point(s) on the line $\frac{x}{2} + y = 1$ that are closest from the point $(3, -2)$

2. Consider the function $f(x, y) = 3x^2 + 2y^2 - 8y + 1$. Find the extreme values of f in the region R described by $x^2 + y^2 \leq 1$.

3. Consider the following integral

$$I = \iint_R (4 + x^2) dA$$

where R is the region between the parabolas $y = 1 + x^2$ and $y = 3 - x^2$.

(a.) Sketch R . Is R a simple region?

(b.) Express I as an iterated integral and evaluate it.

4. Let V be the volume of the solid region bounded above by the plane $z = 4 + x + 2y$, on the sides by the cylinder $x^2 + y^2 = 1$, and below by the xy plane.

(a.) Specify the region R and the function $f(x, y)$ such that $V = \iint_R f(x, y) dA$.

(b.) Express the integral defining V as an iterated integral in polar coordinates and evaluate V .