V1

1	2	3	4	5	6

Last Name:_____

First Name:_____

ID:_____ Section:____

Math 250 Midterm #3. November 14, 2003

Attention! Please, note that this is the closed book test. You are not allowed to use graphing calculator. Simple calculators are allowed. Please, show all important steps in you solution but do not make your solution excessively long.

1. Find the minimum of the function

$$f(x,y) = \sqrt{x^2+1}\,\mathrm{e}^{y^2+2y}.$$

2. Write the Lagrange equations (DO NOT SOLVE) for the problem of minimizing the function

$$f(x, y) = \frac{1}{3}x^3 + \frac{1}{2}y^2 + z,$$

subject to the constraint

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

3. Let S be the region bounded by $y = 0$, $y = \sqrt{x}$, $x = 4$. Evaluate

$$\int_S (y^3 + y)\,\mathrm{d}A.$$

4. Find the area of the part of the surface

$$z = \frac{1}{2}x^2 + 1$$

bounded by the planes $x = 2$, $y = 0$, $y = 2x$.

5. Evaluate integral by using polar coordinates

$$\int_{-2}^{2} \int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}} \sqrt{1-x^2-y^2}\, \mathrm{d}y\, \mathrm{d}x$$

6. Evaluate the mass of the solid

$$B = \{(x, y, z) : 0 \leq x \leq 1, 0 \leq y \leq \sqrt{5}, 0 \leq z \leq \pi/2\}$$

if the density is given by

$$\delta(x, y, z) = x^2 y \cos z.$$