MATH 234 (A. Assadi) Spring 2007

Midterm II

Instructions. (1) This test is CLOSED BOOK. You are allowed to have a note-card with formulas only. Calculators & laptops are allowed ONLY for computation and graphing.

(2) The time is 75 minutes for working on the test.

(3) Please start from the beginning, spend a couple minutes to read over all problems. Don't spend too much time on one problem.

(***) *We rely on honor system for the students to use only their own work and without asking from or offering help to other students. Please Observe the Honor System.*

Time: 75 minutes

YOUR NAME: **TA NAME:**

SECTION:

Problem	Points	Score
1	10	
2	10	
3	10	
4	10	
5	20	
6	20	
7	20	
Total	100	

Midterm II Total

Problem 1. Lagrange's Multiplier. Find all points $P = (x, y, z)$ at which the function $f(x, y, z) = 3x + 4y + z + 7$ attains a minimum subject to the constraint $g(x, y, z) = x^2 + y^2 - z = 0$.

Problem 2. Evaluate the iterated integral $\int_{2}^{5} dx \int_{-x}^{x} dy \int_{0}^{1} (2x + 9y^2z^2) dz$.

Problem 3. Change the order of integration in the double integral $\int_0^3 dx \int_x^5 e^{y+1} dy$.

(You need NOT evaluate the integral).

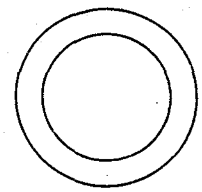
Problem 4. Find the **Jacobian determinant |J|** for the change of variable
$x = 1 + e^{2r}\sin 3\theta$, $y = 2 + e^{2r}\cos 3\theta$.

Problem 5. (a) Find the area of the surface S that is obtained from revolution of the parabola about the y-axis given by the equation $y=x^2 + z^2$ <u>between</u> the planes $y=0$ and $y=12$. (b) Find the volume of the region bounded by the surface in (a) and the plane $y=12$.

Problem 6. The container **V** is defined to be the volume of the spherical shell of inner radius 2 and outer radius 3. The container **V** is placed on the plane z= -3 , and it is filled with a substance that has density ***proportional*** to **depth** of the substance from the bottom of the container. (Hint: The substance has the largest density near the bottom, and its density is smaller near the top. If we call the fixed constant of proportionality c, then the density equation is given by M=c(z+3).)

(a) Find the mass of the substance in **V** in terms of c.

(b) Find the mass of the substance if the container is filled up to the ***height*** equal to three-quarter of its outer radius (the bottom starts from the plane z=-3 and the ¼ radius height portion from the top is empty.)



Problem 7. A solid **V** is the volume between a cylinder **K** [redacted] AND a sphere **S** that is inside **K**. Both **S** and **K** are solids of revolution about the z-axis; they are situated on the (x , y)-plane, and they have the same height and diameter. The sphere **S** has radius 3. Find the volume of **V**.