

**MATH 116 INTERMEDIATE CALCULUS III**  
**MIDTERM II EXAM**

**Date: July 8, 2005,      Time: 9:00-11:00**

SURNAME/NAME:.....

ID:.....                      Section.....

- 1** Check that there are 5 questions on your booklet.
- 2** Show all your work. Correct answers without sufficient explanation may not get full credit.

1	2	3	4	5	TOTAL
20	20	20	20	20	100

**Problem 1.** Let  $R$  be a plane region in the first quadrant bounded by the lines  $y = 7 - x$ ,  $7y = 7 - x$ , and the parabola  $y = 1 + x^2$ . Set up the double integral

$$\int \int_R f(x, y) dA$$

in Cartesian coordinates using the following orders of integration.

(a)  $dx dy$

(b)  $dy dx$

(c) Integrate function  $f(x, y) = \frac{1}{\sqrt{y}}$  over the region  $R$ .

**Problem 2.** Let  $R$  be the triangle with vertices  $(0, 0)$ ,  $(1, 0)$  and  $(0, 1)$ . Evaluate the integral

$$\int \int_R e^{(y-x)/(x+y)} dA$$

- Problem 3.** (a) Sketch the solid  $D$  between the graphs of  $z = 0$ ,  $z = \sqrt{1-y}$  and lying above the plane region  $R$  which is bounded by  $y = \sqrt{x-1}$ ,  $y = 0$ ,  $y = 1$ , and  $x = 0$ .
- (b) Evaluate the volume  $V$  of the solid  $D$  described in part (a).

**Problem 4.** Consider integral

$$I = \int_0^{2\pi} \int_0^2 \int_0^{\sqrt{9-r^2}} r^2 dz dr d\theta$$

- (a) Write integral  $I$  in rectangular coordinates. (Do not evaluate the integral).
- (b) Write integral  $I$  in spherical coordinates. (Do not evaluate the integral).

**Problem 5.** Find the work done by the force  $F = y\vec{i} + (y^2 + z)\vec{j} + (x^2 - z)\vec{k}$  over the curve of intersection of the surfaces  $z = x^2$  and  $x^2 + y^2 = 4$ .