Exam 2, Math 2163, Sec 001 & 003, Fall 2005

Name : _____ **Section :** 1(7:30) 3(9:30) circle one.

Each problem below requires some arguments and/or computations. You should clearly and completely show all your work and reasons to receive full credit. You may use any statement from the book and the class as long as you clearly state what fact you are using.

1.(3 pts) Let $x = u^2 + v$ and $y = u - v^2$. Compute the Jacobian

$$\frac{\partial(x,y)}{\partial(u,v)} = \begin{vmatrix} \frac{\partial x}{\partial u} & \frac{\partial x}{\partial v} \\ \\ \frac{\partial y}{\partial u} & \frac{\partial y}{\partial v} \end{vmatrix}.$$

2.(3 pts) Find the average value of $f(x,y) = x^3y^2$ over the rectangle with vertices $(-1,0), (-1,5), (1,5), (1,0)$.

3.(4 pts) Find the center of mass of the tetrahedron E bounded by the planes $x = 0$, $y = 0$, $z = 0$, $x + y + z = 1$ and with density $\rho(x, y, z) = 1$. (Hint: By symmetry, the values of $\overline{x}$, $\overline{y}$, and $\overline{z}$ are equal, so you only need to computer one of them.)

4.(3 pts) Find the area of the part of the surface $z = xy$ that lies within the cylinder $x^2 + y^2 = 1$.

5.(4 pts) Evaluate the integral

$$\iint_R e^{(x+y)/(x-y)}\, dA,$$

where R is the trapezoidal region with vertices $(1,0), (2,0), (0,-2), (0,-1)$.

6.(3 pts) Rewrite the integral

$$\int_0^1 \int_{x^2}^1 \int_0^{1-z} f(x,y,z)\,dy\,dz\,dx$$

as an iterated integral in the order $dx\,dy\,dz$.