## MAC 2313 (Calculus III)-U03 Test 2, Thursday February 28, 2008

Name: PID:

Remember that no documents or graphing calculators are allowed during the test. Be as precise as possible in your work; you shall show all your work to deserve the full mark assigned to any question. Do not cheat, otherwise I will be forced to give you a zero and report your act of cheating to the University Administration. Good luck.

a) 
$$\int_{-1}^{1} \int_{x}^{x^{2}} \int_{0}^{\ln z} xe^{y} \, dy \, dz \, dx =$$

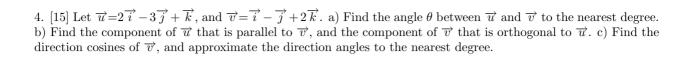
b) 
$$\int_0^1 \int_1^2 (x - 2z) \, dx dz =$$

c) 
$$\int_{\frac{1}{2}}^{1} \int_{x}^{\frac{1}{x}} x \, dy dx =$$

d) 
$$\int_{-1}^{1} \int_{0}^{\sqrt{1-y^2}} \int_{0}^{\sqrt{1-x^2-y^2}} (x^2+y^2+z^2)^{\frac{-3}{4}} dz dx dy =$$

2. [15] Use polar coordinates to evaluate  $\int_0^1 \int_{x^2}^x \sqrt{x^2 + y^2} \, dy dx$ . (Hint. First sketch the region of integration.)

3. [18] Let x = u - v + w, y = v - w, z = w - u. Find the jacobians  $\frac{\partial(x,y,z)}{\partial(u,v,w)}$  and  $\frac{\partial(u,v,w)}{\partial(x,y,z)}$ 



5. [10] Use an appropriate order of integration to evaluate  $\int \int_{\mathcal{R}} y \sin(xy) dA$ , where  $\mathcal{R} = \{(x,y); 0 \le x \le 1, 0 \le y \le \pi/4$ 

6. [16] Let f(x,y) = x + y + z. Use the Lagrange multipliers to find the maximum and minimum values of f subject to the constraint:  $x^2 + y^2 - z^2 = 1$ .