

Quiz 9 - Math 53
November 6, 2008

Name _____

Let E be the region bounded by the ellipsoid $\left(\frac{x-y}{e}\right)^2 + (x+y)^2 + \left(\frac{z}{3}\right)^2 = 1$. Your goal is to integrate the function $x^2 - y^2$ over the region E .

a)[4pts] Use a change of coordinates to rewrite the integral $\iiint_E (x^2 - y^2) dV$ as an integral over the ball B of radius 1 centered at $(0, 0, 0)$ in (u, v, w) -space. The final result should be a triple integral over B of some function in u, v , and w . If you call me over, I'll give you the change of coordinates for a penalty of 1 point.

b)[3pts] Convert the integral you got in part (a) into spherical coordinates (in (u, v, w) -space). Remember that u, v , and w take the place of x, y , and z in the formulae you're used to; for example, $w = \rho \cos \phi$.

c)[2pts] Evaluate the integral from part (b).