Math 213 Calculus III

Reading the Text

Read Section 12.7-12.9 and answer the following questions

1. In the expression $\iiint_E f(x,y,z)\,dV$, what does the E and the dV mean?
2. What is the solid described by the integral $\int_{\pi/2}^{\pi}\int_{0}^{2\pi}\int_{0}^{\sqrt{3}} \rho^2 \sin\phi \, d\rho\, d\theta\, d\phi$?
3. When we convert a double integral from rectangular coordinates to spherical coordinates, where does the $\rho^2 \sin\phi$ term come from?
4. The *unit square* is the square with side length 1 and lower left corner at the origin. What is the area of the image R (in the xy plane) of the unit square S (in the uv plane) under the transformation $\begin{aligned} x &= u + 2v \\ y &= -6u - v \end{aligned}$?