Math 324 Quiz 2 Practice

January 26, 2017

Problem 1. Convert the point $(4, 4, 4)$ from cartesian coordinates to spherical coordinates.

Problem 2. Convert the point $(1, \pi/4, \pi/3)$ from spherical coordinates to cartesian coordinates.

Problem 3. Write down the Jacobian for spherical coordinates

Problem 4. Using spherical coordinates, set up an integral to find the volume outside of the cylinder $x^2+y^2 = 1$ and inside the sphere $x^2+y^2+z^2 = 4$. **Do not evaluate it**

Problem 5. Consider the change of variables

$$u = x^2 - y^2$$

$$v = 2xy.$$

Let R be the region R in the x, y-plane defined by all (x, y) with $x^2 + y^2 \leq 1$ and $|y| \leq x$.

(a) Sketch a graph of the region R in the x, y-plane.

(b) Show that the change of variables sends R to the half-disk S in the u, v-plane defined by $u^2 + v^2 \leq 1$ and $u > 0$.