

Assignment 3, Due Monday, July 29 at 4:30 pm.

1. Express the volume of the sphere centered at $(0, 0, 1)$ with radius 1 as a triple integral using a type 3 region (in \mathbb{R}^3) and then a type II region (in \mathbb{R}^2).
[Here by type 3 I mean $u_1(x, z) \leq y \leq u_2(x, z)$ and $(x, z) \in \mathcal{D}$. Also type II here means $g_1(x) \leq z \leq g_2(x)$ and $a \leq x \leq b$.] (Do NOT take the integral!)

2. (a) Express the area of the Part of the plane enclosed by the lines $y = x$, $y = -x$, and $y = 1$ as a double integral in polar coordinates.
- (b) (Extra credit:) Evaluate the integral in part a.

3. Consider the solid S bounded by two cylinders $x^2 + y^2 = 1$ and $x^2 + z^2 = 1$.
- (a) Find the volume of S .
 - (b) Find the surface area of S

4. (Extra credit:) Consider the solid S bounded by three cylinders $x^2 + y^2 = 1$, $x^2 + z^2 = 1$, and $y^2 + z^2 = 1$.
- (a) Find the volume of S .
 - (b) Find the surface area of S