

Analytic Geometry and Calculus III (22005 Section 002)
Home work 9, due Monday, November 21
Instructor: Prof. Artem Zvavitch

Problem 1. Use spherical coordinates to evaluate

$$\int \int \int_E x e^{(x^2+y^2+z^2)^3} dV,$$

where E is the solid that lies between the spheres $x^2 + y^2 + z^2 = 4$ and $x^2 + y^2 + z^2 = 16$ in the first octant.

Problem 2. Consider the transform $T : x = 2u + v, y = u + 2v$. Describe the image S under T of the unit square $R = \{(u, v) : 0 \leq u \leq 1, 0 \leq v \leq 1\}$ in the uv -plane using a change of coordinates. Evaluate

$$\int \int_S 3x + 2y dA$$

Problem 3. Consider the transform $T : x = v \cos 2\pi u, y = v \sin 2\pi u$. Describe the image S under T of the unit square $R = \{(u, v) : 0 \leq u \leq 1, 0 \leq v \leq 1\}$ in the uv -plane using a change of coordinates. Find the area of S .