

## 427L: Integration in different coordinate systems

1. Let  $B$  be the unit ball in  $\mathbb{R}^3$ . Evaluate the integral

$$\iiint_B \frac{dx \, dy \, dz}{\sqrt{2 + x^2 + y^2 + z^2}}.$$

2. Let  $T : \mathbb{R}^2 \rightarrow \mathbb{R}^2$  be the mapping

$$x(w, z) = w - 2z + 1, \quad y(w, z) = 3w + z - 2.$$

Rewrite the iterated integral

$$\int_0^1 \int_0^2 f \circ T(w, z) \, dw \, dz$$

as an iterated integral in  $x, y$  coordinates over some region  $R \subset \mathbb{R}^2$ .