MAT236 – Assignment 4 Solutions

Problem 1

We are given the vector field

$$F : \mathbb{R}^3 \setminus \{0\} \to \mathbb{R}^3, \qquad F(\mathbf{r}) = \frac{\mathbf{r}}{\|\mathbf{r}\|^3} + (0, 0, z), \quad \mathbf{r} = (x, y, z).$$

Let Ω be the solid ball of radius 2, centered at the origin,

$$x^2 + y^2 + z^2 \leq 4,$$

with the open cylindrical region

$$x^2 + y^2 < 1$$