

Calculus

1. Evaluate the definite integral

$$\int_0^{\sqrt{3}-1} \frac{dx}{2 + 2x + x^2}$$

2. Find, with justification, an approximate value for $\sin(0.1)$, within the range of error 0.001.

3. Let S denote the unit sphere in \mathbb{R}^3 oriented by the outward normal vector. Evaluate the surface integral

$$\iint_S (x \, dy \, dz - y \, dx \, dz + z \, dx \, dy)$$