Problems

Problem 2.1. (2 points)

Let the vector field $\boldsymbol{f}$ be defined by

$$\boldsymbol{f}(x, y, z) = (y, x - 2xz, -xy).$$

Evaluate

$$\int_S (\operatorname{rot} \boldsymbol{f}) \cdot \boldsymbol{n} \, dS,$$

where S is the surface of the sphere $x^2 + y^2 + z^2 = r^2$, $r > 0$, and $\boldsymbol{n}$ is the unit outer normal vector to S.