MTH241 Fall 2024: Quiz 10

Name:

UID:

Closed book, no calculator, show your work clearly.

1. (`5pt`) Let Σ be the surface of the outward-oriented cube with opposite corners $(0,0,0)$ and $(2,2,2)$ and $\vec{F}(x,y,z) = 5x\vec{i} + 2y\vec{j} - 2z\vec{k}$. Evaluate the surface integral $\iint_\Sigma \vec{F} \cdot \vec{n} dS$. (Hint: use the Divergence Theorem)

2. (`5pt`) Let Σ be the part of the sphere $x^2 + y^2 + z^2 = 4$ which is above the xy-plane with the unit normal pointing outward. Compute $\iint_\Sigma (\text{curl}\vec{F}) \cdot \vec{n}\, dS$ where $\vec{F}(x,y,z) = y\vec{i} + z\vec{j} + x\vec{k}$. (Hint: Use the Stokes's Theorem)

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