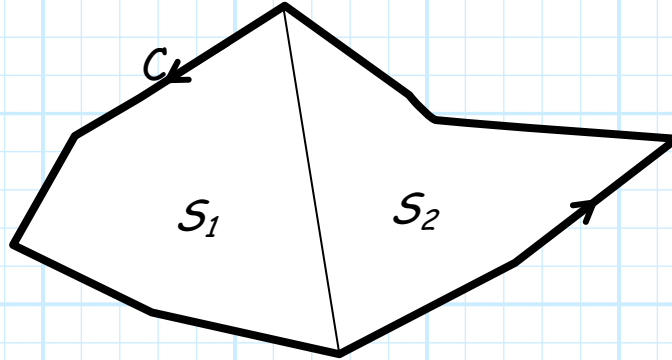


Special Problem 2-5.30

A **closed contour** C completely surrounds some surface S . Surface S can be segmented into sections S_1 and S_2 , such that $S = S_1 + S_2$.



There exists some vector field $\mathbf{A}(\vec{r})$.

The following facts are known:

$$\int_C \mathbf{A}(\vec{r}) \cdot d\vec{\ell} = 6 \quad \text{and} \quad \iint_{S_1} \nabla \times \mathbf{A}(\vec{r}) \cdot d\vec{s} = 2$$

where $d\vec{s}$ is pointing **outward** from the page.

1. Determine the **value** of surface integral (make sure you give complete, detailed and specific justification for your result):

$$\iint_{S_2} \nabla \times \mathbf{A}(\vec{r}) \cdot d\vec{s} .$$

2. **Is** the vector field $\mathbf{A}(\vec{r})$ **conservative** (make sure you give complete, detailed and specific justification as to why or why not)?

3. **Is** the vector field $\nabla \times \mathbf{A}(\vec{r})$ **solenoidal** (make sure you give complete, detailed and specific justification as to why or why not)?