Warm-up for Electromagnetic Theory (PHYS330)

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Abstract

A line integral and a surface integral.

1 Practing Line Integrals

Let $\vec{f}(x, y) = x\hat{x} + y\hat{y}$. Compute the line integral of this function around the unit circle *(the path C where $r = 1$ with $\phi \in [0, 2\pi]$).*

$$\oint \vec{f} \cdot d\vec{l} = \tag{1}$$

2 Practicing Surface Integrals

Let $\vec{f}(x, y) = -y\hat{x} + x\hat{y}$. Compute the surface integral of this vector field over the unit sphere *(the surface area A bounding the volume with $r = 1$).*

$$\oint \vec{f} \cdot d\vec{a} = \tag{2}$$