Homework 2 - Electromagnetism

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I pledge my honor that I have abided by the Stevens Honor System.

February 13, 2025

Problem 1

$$\vec{v} = x^2\hat{x} + 2yz\hat{y} + y^2\hat{z}$$

- $(0,0,0) \to (1,0,0) \to (1,1,0) \to (1,1,1)$

$$(0,0,0) \to (1,0,0) = \int_{(0,0,0)}^{(1,0,0)} \vec{v} \cdot dl = \int_0^1 x^2 dx = \frac{1}{3}$$
$$(1,0,0) \to (1,1,0) = \int_{(1,0,0)}^{(1,1,0)} \vec{v} \cdot dl = \int_0^1 2yz dy = 0 \quad (z = 0)$$
$$(1,1,0) \to (1,1,1) = \int_{(1,1,0)}^{(1,1,1)} \vec{v} \cdot dl = \int_0^1 y^2 dz = \int_0^1 dz = 1 \quad (y = 1)$$
$$\text{Total} = \frac{1}{3} + 0 + 1 = \frac{4}{3}$$

- $(0,0,0) \to (0,0,1) \to (0,1,1) \to (1,1,1)$

$$(0,0,0) \to (0,0,1) = \int_{(0,0,0)}^{(0,0,1)} \vec{v} \cdot dl = \int_0^1 y^2 dz = 0 \quad (y = 0)$$
$$(0,0,1) \to (0,1,1) = \int_{(0,0,1)}^{(0,1,1)} \vec{v} \cdot dl = \int_0^1 2yz dy = \int_0^1 2y dy = 1 \quad (z = 1)$$
$$(0,1,1) \to (1,1,1) = \int_{(0,1,1)}^{(1,1,1)} \vec{v} \cdot dl = \int_0^1 x^2 dx = \frac{1}{3}$$
$$\text{Total} = 0 + 1 + \frac{1}{3} = \frac{4}{3}$$

- straight line from $(0,0,0)$ to $(1,1,1)$