

"Quiz" for Lecture 24 - Shaun Boda

January February March April May June July August September October November December

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

By using Stokes's theorem, or otherwise, evaluate $\int_C F \cdot dr$, where

$$F(x, y, z) = (yz + 2y + 3z)i + (xz + 2x + 4z)j + (xy + 3x + 4y)k$$

Where C is the curve of intersection of the plane $x + y + z = 1$ and the cylinder $x^2 + y^2 = 1$ oriented counterclockwise as viewed from above. Be sure to explain everything.

$$g(x, y) = 1 - x - y$$

$$D = \{(x, y) \mid -1 \leq x \leq 1, -1 \leq y \leq 1\}$$

$$\text{Curl } F = \begin{vmatrix} i & j & k \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ yz + 2y + 3z & xz + 2x + 4z & xy + 3x + 4y \end{vmatrix}$$

$$= ((x + \cancel{y}) - (x + \cancel{y}))i - ((y + \cancel{z}) - (y + 3))j + ((z + \cancel{x}) - (z + 2))k$$
$$= \langle 0, 0, 0 \rangle$$

$$\int_C F \cdot dr = \int_S \text{curl } F \cdot dS = \int_S \langle 0, 0, 0 \rangle \cdot dS = 0$$

answer is 0