"QUIZ" for Lecture 24

NAME: (print!) Gillian Mulvoy Section: ____

E-MAIL SCANNED .pdf OF COMPLETED QUIZ to DrZcalc3@gmail.com (Attachment: q24FirstLast.pdf) ASAP BUT NO LATER THAN Dec. 4, 2020, 8:00pm

By using Stokes' Theorem, or otherwise, evaluate $\int_C \mathbf{F} \cdot d\mathbf{r}$, where

$$F(x,y,z) = (yz + 2y + 3z)\mathbf{i} + (xz + 2x + 4z)\mathbf{j} + (xy + 3x + 4y)\mathbf{k} \quad ,$$

where C is the curve if 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.

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

$z = 1 - x - y$

$$(x+4-x-4)i - (y+3-y-3)j + (z+2-z-2)k$$

$$0i + 0j + 0k \qquad \langle 0,0,0 \rangle$$

$$\int_C F \cdot dr = \int \text{curl}(F)$$

$$= \int \langle 0,0,0 \rangle$$

$$= 0$$

Since $\int_C F \cdot dr = \int \text{curl}(F)$ by the Stoke's Theorem, the first step is to find the curl. Since the curl gives a zero vector, the $\int F \cdot dr$ is 0.