"QUIZ" for Lecture 24

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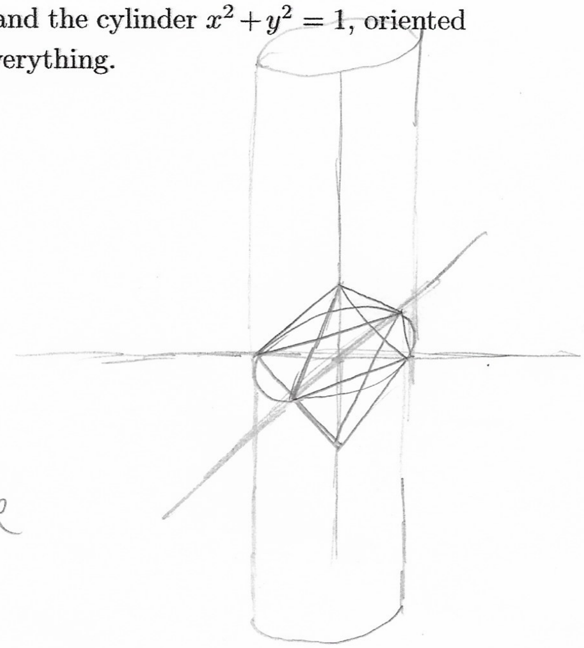
E-MAIL SCANNED .pdf OF COMPLETED QUIZ to DrZcalc3@gmail.com (Attachment: q24FirstLast.pdf) ASAP BUT NO LATER THAN Dec. 4, 2020, 8:00pm

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.



Stokes' Thm

$$\int_C F \cdot dr = \iint \operatorname{curl}(F) \cdot dS$$

curl(F) =

$$\det \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ yz+2y+3z & xz+2x+4z & xy+3x+4y \end{vmatrix}$$

F is conservative

$$= \left(\cancel{(x+4)} - \cancel{(x+4)}\right)\hat{i} - \left(\cancel{(y+3)} - \cancel{(y+3)}\right)\hat{j} + \left(\cancel{z+2} - \cancel{z+2}\right)\hat{k} = \boxed{0}$$

$$\therefore \int F \cdot dr = \iint \operatorname{curl}(F) \cdot dS = \iint 0 \cdot dS = \boxed{0}$$