"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

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

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.

① $x+y+z=1$
$z=1-x-y$ so
$g(x,y)=1-x-y$

$\frac{dR}{dy} = \frac{dQ}{dz}$
↳ $x+y = x+y$ ✓

$r\,dr\,d\theta$

$\frac{dQ}{dx} = \frac{dP}{dy}$
↳ $z+2 = z+2$ ✓

$\frac{dR}{dx} = \frac{dP}{dz}$
↳ $y+3 = y+3$ ✓

② $x=\cos\theta$ $R=1$
$y=\sin\theta$
so $D=\{(x,y) \mid 0 \le r \le 1,\ 0 \le \theta \le 2\pi\}$

~ Since it is a conservative vector field and its a closed curve, it is automatically 0.

$\int_C F \cdot dr = 0.$