"QUIZ" for Lecture 25

NAME: (print!) SAI EMBAR **Section:** 23

E-MAIL SCANNED .pdf OF COMPLETED QUIZ to DrZcalc3@gmail.com (Attachment: q25FirstLast.pdf) ASAP BUT NO LATER THAN Dec.8,2020, 8:00pm

Let

$$F(x,y,z) =$$

$$\langle \cos(\sqrt{1+x^7}+zy^9) \ , \ \tan(x^7+y^2+1/z) \ , \ \tan^{-1}(e^{xyz}+\cos^6(x^8-y+3z)) \rangle \ ,$$

and let $\langle P,Q,R\rangle = curl\ \mathbf{F}$. Compute

$$\frac{\partial P}{\partial x}+\frac{\partial Q}{\partial y}+\frac{\partial R}{\partial z} \ .$$

Be sure to explain everything.

We have to compute $div(\langle P,Q,R\rangle)$ but $\langle P,Q,R\rangle = curl(F)$

So $div(curl(F))$.

But the theorem says that this is always a 0 function.

$\boxed{0}$

2. Calculate the surface integral
$\int\int_S \mathbf{F}\cdot d\mathbf{S}$, where

$$\mathbf{F}(x,y,z) = \langle 2x+y+z \ , \ x+2y+z \ , \ x+y+2z \rangle$$

where S is the surface of the box bounded by the planes $x=0$, $x=1$, $y=0$, $y=4$, $z=0$, $z=5$.

$div(F) = \frac{\partial(2x+y+z)}{\partial x} + \frac{\partial(x+2y+z)}{\partial y} + \frac{\partial(x+y+2z)}{\partial z} = 2+2+2 = 6$

$\iint_S F\cdot ds = \iiint_E 6\,dV$

$6 \cdot Volume(Box)$

$1\cdot 4\cdot 5 = 20$, so $6\cdot 20 = \boxed{120}$