"QUIZ" for Lecture 25

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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

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

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

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

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

Be sure to explain everything.

$\frac{\partial P}{\partial x} + \frac{\partial Q}{\partial y} + \frac{\partial R}{\partial z} = 0$

When you take the divergence of the curl of a function, the answer is always 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 $x=0$, $x=1$, $y=0$, $y=4$, $z=0$, $z=5$.

$\iint_S F \cdot dS = \iiint_E div(F)\, dV$

$E = \{(x,y,z) \mid 0 \le x \le 1,\ 0 \le y \le 4,\ 0 \le z \le 5\}$

$P_x = 2,\ Q_y = 2,\ R_z = 2$

$\int_0^5\int_0^4\int_0^1 6\, dx\, dy\, dz = \left(\int_0^1 6\, dx\right)\left(\int_0^4 dy\right)\left(\int_0^5 dz\right)$

$6(4)(5)$

$= 120$