

“QUIZ” for Lecture 25

NAME: (print!) Krithika Patrachari Section: 22

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

$$\frac{\partial P}{\partial x} + \frac{\partial Q}{\partial y} + \frac{\partial R}{\partial z} \rightarrow \text{div}(\text{curl}(\mathbf{F}))$$

Be sure to explain everything.

Answer = 0

because the div of a curl of a function 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 $x = 0, x = 1, y = 0, y = 4, z = 0, z = 5$.

$$\text{div}(\mathbf{F}) = 2 + 2 + 2 = 6$$

$$\iiint 6 \, dV \quad \{(x, y, z) \mid 0 \leq x \leq 1, 0 \leq y \leq 4, 0 \leq z \leq 5\}$$

$$\int_0^1 \int_0^4 \int_0^5 6 \, dz \, dy \, dx$$
$$\underbrace{6z \Big|_0^5}_{6 \cdot 21 = 30} \rightarrow \int_0^4 30 \, dy = 30y \Big|_0^4 = 120 \rightarrow \int_0^1 120 \, dx = 120x \Big|_0^1 = 120$$