

“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

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

and let $(P, Q, R) = \text{curl } \mathbf{F}$. Compute

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

Be sure to explain everything.

Ans. taking the divergence of curl is always 0, the answer is 0

2. Calculate the surface integral

$$\iint_S \mathbf{F} \cdot d\mathbf{S}, \text{ where}$$

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

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

2.
 $\text{div}(F) = 2 + 2 + 2 = 6$
 $\{(x, y, z) \mid 0 \leq x \leq 1, 0 \leq y \leq 4, 0 \leq z \leq 5\}$
 $\iint_S F \cdot ds = \iiint_E \text{div } F \, dV$
 $= \int_0^1 \int_0^4 \int_0^5 6 \, dz \, dy \, dx$
 $= 6 \times (1 \times 4 \times 5)$
 $= 120$
Ans. 120