"QUIZ" for Lecture 19

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E-MAIL SCANNED .pdf OF COMPLETED QUIZ to DrZcalc3@gmail.com (Attachment: q19FirstLast.pdf) ASAP BUT NO LATER THAN Nov. 12, 8:00pm

1.

Determine whether or not the vector field

$$F(x,y,z) = y^2z^3\,\mathbf{i} + 2xyz^3\,\mathbf{j} + 3xy^2z^2\,\mathbf{k}$$

is conservative. If it is conservative, find a function f such that $\mathbf{F} = \nabla f$.

$\text{Curl}(F) = \left\langle \frac{\delta}{\delta x}, \frac{\delta}{\delta y}, \frac{\delta}{\delta z} \right\rangle \times \langle y^2z^3, 2xyz^3, 3xy^2z^2 \rangle =$

$\left\langle \frac{\delta}{\delta y} 3xy^2z^2 - \frac{\delta}{\delta z} 2xyz^3, \frac{\delta}{\delta x} 3xy^2z^2 - \frac{\delta}{\delta z} y^2z^3, \frac{\delta}{\delta x} 2xyz^3 - \frac{\delta}{\delta y} y^2z^3 \right\rangle =$

$\langle 6xyz^2 - 6xyz^2, 3y^2z^2 - 3y^2z^2, 2yz^3 - 2yz^3 \rangle = 0$; Yes its conservat

$\int f_x\,dx = \int y^2z^3\,dx = xy^2z^3 + g(y,z)$

$\int f_y\,dy = \int 2xyz^3\,dy = xy^2z^3 + g(x,z)$

$\int f_z\,dz = \int 3xy^2z^2\,dz = xy^2z^3 + g(x,y)$

$f = xy^2z^3$

2. Show that the line integral

$$\int_C 2xy^2\,dx + 2x^2y\,dy \quad ,$$

is independent of the path C, and evaluate it if C is *any* path from $(1,0)$ to $(0,1)$.

P Q

$\int_C x^2y^2\,dr = 0$ because $f(P) = f(Q)$

and the

integrand is conservative