"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

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

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

$\begin{vmatrix} i & j & k \\ dx & dy & dz \\ y^2z^3 & 2xyz^3 & 3xy^2z^2 \end{vmatrix}$ $\hat{i}(3\cdot 2\cdot xyz^2 - 2\cdot 3\cdot xyz^2)$

$= \hat{j}(3y^2z^2 - 3y^2z^2) = 0,0,0$

$+\hat{k}(2yz^3 - 2yz^3)$

$\int y^2z^3\,dx \to y^2z^3x + g(y,z)$

$2yz^3x + g_y = 2xyz^3$

$g_y = 0 \quad g(y,z) = h(z)$

$3y^2z^2x + h(z) = 3xy^2z^2$

$h'(z) = 0$

$\int 0\,dz = C$

$f = y^2z^3x$

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 $(0, 1)$.

$\int 2xy^2\,dx \to x^2y^2 + g_y \qquad 2yx^2 + g_y = 2x^2y \qquad g'y = 0 = C$

$f = x^2y^2 + C \qquad f|_{1,0} = 0 \quad f|_{0,1} \quad C = 0$