"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

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

(F_1 F_2 F_3)

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

$F_1 = \frac{df}{dx} = y^2z^3$

$F_2 = 2xyz^3$

$2xyz^3 + g_y(y,z) = 2xyz^3$

$g = 0$

$g(y,z) = \int 0\,dy = 0 + h(z)$

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

$F_3 = 3xy^2z^2$

$3xy^2z^2 + h'(z) = 3xy^2z^2$

$h'(z) = 0$

$h(z) = \int 0\,dz = 0 + c$

$f(x,y,z) = xy^2z^3$

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 $(0,1)$.

$F = \langle 2xy^2, 2x^2y \rangle$ $F_1 = 2xy^2$, $F_2 = 2x^2y$ $(F_1)_y = 4xy$, $(F_2)_x = 4xy$, $(F_1)_y = (F_2)_x$

$\frac{df}{dy} = 2x^2y + g'(y)$ $\frac{dx}{dy} = 2x^2$ $2x^2y + g'(y) = 2x^2y$ $f(x,y) = x^2y^2$

$(1,0)$ $(0,1)$ $f(0,1) - f(1,0) = 0^2 \cdot 1 - 1^2 \cdot 0 = 0$

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