"QUIZ" for Lecture 23

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E-MAIL SCANNED .pdf OF COMPLETED QUIZ to DrZcalc3@gmail.com (Attachment: qXFirstLast.pdf) ASAP BUT NO LATER THAN Dec. 1, 2020, 8:00pm

1. Determine whether or not the vector field is conservative. If it is, find a function f such that $\mathbf{F} = \nabla f$.

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

$$\left(\begin{array}{l}(9x^2y^3z^2 + x) - (9x^2y^3z^2 + x), \\ (9x^2y^3z^2 + y) - (9x^2y^3z^2 + y), \\ (9x^3y^2z^3 + z) - (9x^3y^2z^3 + z)\end{array}\right) \rightarrow (0,0,0) \rightarrow \text{conservative!}$$

$f_x = 3x^2y^3z^3 + yz \qquad f_y = 3x^3y^2z^3 + xz \qquad f_z = 3x^3y^3z^2 + xy$

$$\boxed{f = x^3y^3z^3 + xyz}$$

2. Evalute

$$\int_C 5y\,dx + 10x\,dy\,, \qquad \leftarrow 2D\ \checkmark$$

where C is the closed curve consisting of the boundary of the rectangle

$$\{(x,y)|0 \le x \le 1 \quad , \quad 0 \le y \le 1\}.$$

$(0,0) \quad (0,1) \quad (1,0) \quad (1,1)$

$Q_x = 10 \qquad P_y = 5$

$Q_x - P_y = 10 - 5 = 5$

$$\iint 5\,dy\,dx \rightarrow \int_0^1 5\,dy$$

$$\int_0^1 5\,dx = \boxed{5}$$