

"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  $\mathbf{F} = \nabla f$ .

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

$$\frac{3x^2 \cdot 3y^2 z^3 + z = \nabla x^2 y^2 z^3 + z \quad | \quad 3x^2 y^3 3z^2 + y = \nabla x^2 y^3 z^2 + y}{3x^3 y^2 3z^2 + x = 3x^3 3y^2 z^2 + x} \quad \checkmark$$

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

$$g'(y) + 3x^3 y^2 z^3 + z x = 3x^3 y^2 z^3 + xz \Rightarrow g'(y) = 0 \quad g(y) = 0$$

$$g'(z) + 3x^3 y^3 z^2 + y x = 3x^3 y^3 z^2 + x y \Rightarrow g'(z) = 0 \quad g(z) = 0$$

$$f = x^3 y^3 z^3 + yz x$$

2. Evaluate

$$\int_C 5y \, dx + 10x \, dy \quad ,$$

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

$$\{(x, y) \mid 0 \leq x \leq 1 \quad , \quad 0 \leq y \leq 1\}.$$

$$Q-x = 10 \quad P-y = 5 \quad 10 - 5 = 5$$

$$5 \cdot \text{area} \\ 5 \cdot 1 = 5$$

