

"QUIZ" for Lecture 23

NAME: (print!) Joe Barr Section: 24

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

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

$$\begin{aligned} \int 3x^2y^3z^3 + yz \, dx &= x^3y^3z^3 + xyz + g(y, z) & \text{curl}(\mathbf{F}) &= \mathbf{0} \\ \int (3x^3y^2z^3 + xz) \, dy &= x^3y^3z^3 + xyz + g(x, z) & g(y, z) &= g(x, z) = g(x, y) \\ \int (3x^3y^3z^2 + xy) \, dz &= x^3y^3z^3 + xyz + g(x, y) & \hat{f} &= x^3y^3z^3 + xyz \end{aligned}$$

2. Evaluate

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

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

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

$$\iint_D 5 - 10 \, dx \, dy = -5$$

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