

"QUIZ" for Lecture 16

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E-MAIL SCANNED .pdf OF COMPLETED QUIZ to DrZcalc3@gmail.com (Attachment: q16FirstLast.pdf) ASAP BUT NO LATER THAN Nov. 2, 8:00pm

1. Compute the Jacobian of the transformation

$$\Phi(r, s) = (rs, r + s)$$

$$\begin{vmatrix} s & 1 & 0 \\ r & 1 & 0 \\ 0 & 0 & 0 \end{vmatrix}$$
$$= s \begin{vmatrix} 1 & 0 \\ 0 & 0 \end{vmatrix} - 1 \begin{vmatrix} r & 0 \\ 0 & 0 \end{vmatrix} + 0 \begin{vmatrix} r & 1 \\ 0 & 0 \end{vmatrix}$$
$$= \boxed{0} \quad (?)$$

2. Let $D = \Phi(R)$ where $\Phi(u, v) = (u + v, v^2)$ and $R = [0, 6] \times [1, 2]$. Calculate

$$\iint_D y \, dA$$

(Note: it is not necessary to compute D).

$$\begin{aligned} x &= u + v \\ y &= v^2 \\ (0, 1) &\rightarrow (1, 1) \\ (6, 2) &\rightarrow (8, 4) \end{aligned}$$

$$\int_1^2 \int_0^6 y \, dx \, dy$$
$$= yx \Big|_0^6 = 3y$$

$$\int_1^2 3y \, dy = \frac{3y^2}{2} \Big|_1^2 = \boxed{17.25}$$