

"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

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

$$x = rs \quad y = r + s$$

$$\begin{vmatrix} \frac{dx}{dr} & \frac{dx}{ds} \\ \frac{dy}{dr} & \frac{dy}{ds} \end{vmatrix} = \begin{vmatrix} s & r \\ 1 & 1 \end{vmatrix} = s - r$$

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

$$\iint_D y \, dA \quad \cdot \quad xy \text{ language}$$

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

$$\begin{aligned} x &= au + bv, \quad y = cu + dv \\ x = (6v) &= (3, 4) \quad y = u + 2v \end{aligned}$$

$$\Phi(0, 6) = (6, 36)$$

$$\Phi(1, 2) = (3, 4)$$

$$6 \int_0^6 \int_0^4 u + 2v \, dv \, du = uv + v^2 \Big|_0^4 = 4u + 16 - 3u + 9$$

$$u + 5$$

$$6 \int_0^3 u + 5 \, du = \frac{u^2}{2} + 5u \Big|_0^3 = 828 - 18 = 780$$