"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 transfomation

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

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

$$\begin{bmatrix} \frac{\partial x}{\partial r} & \frac{\partial x}{\partial s} \\ \frac{\partial y}{\partial r} & \frac{\partial y}{\partial s} \end{bmatrix} = \begin{bmatrix} s & r \\ 1 & 1 \end{bmatrix} = \boxed{r-s}$$

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

$$\int\int_{\mathcal{D}} y \, dA \quad .$$

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

$(0,6) = 0 = u+v, \; 6 = u+v$
$(1,2) = 1 = v^2, \; 2 = v^2$

$v = -1, \; v = \sqrt{2}$

$v = -1, \; v = 6-v$

$$\int_1^{\sqrt{2}} \int_{-1}^{6-v} v^2 \, du\, dv = v^2 v \Big|_{-1}^{6-v} =$$

$$\int_{-1}^{\sqrt{2}} (7-v)v^2 \, dv = \frac{-v^3(3v-28)}{12} \Big|_{-1}^{\sqrt{2}}$$

$$\approx 8.183$$