"QUIZ" for Lecture 16

NAME: (print!) Shaun Goda **Section:** 23

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

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

$x = rs$

$y = r+s$

$\frac{\partial x}{\partial r} = s \quad \frac{\partial x}{\partial s} = r$

$\frac{\partial y}{\partial r} = 1 \quad \frac{\partial y}{\partial s} = 1$

$\begin{bmatrix} s & r \\ 1 & 1 \end{bmatrix}$

$= \boxed{s - r}$

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).

$x = u + v$

$y = v^2$

$\frac{\partial x}{\partial u} = 1 \quad \frac{\partial x}{\partial v} = 1$

$\frac{\partial y}{\partial u} = 0 \quad \frac{\partial y}{\partial v} = 2v$

Jacobian $= (1)(1) - (0)(1) = 1$

$\int\int_0 v^2 |1| \, dA = \int\int_0 v^2 \, dA$

$\int_0^6 \int_1^2 v^2 \, dv \, du \Rightarrow \left| \frac{v^3}{3} \right|_1^2 = \frac{8}{3} - \frac{1}{3} = \frac{7}{3}$

$\int_0^6 \frac{7}{3} \, du = \frac{42}{3} = \boxed{14}$