"QUIZ" for Lecture 16

NAME: (print!) Irina Mukhametzhanova **Section:** 24

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

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

The formula for the Jacobian is:

$$J = \begin{vmatrix} x_r & x_s \\ y_r & y_s \end{vmatrix}$$

So, we first find all of the partial derivatives required:

$x = rs \rightarrow x_r = s \quad x_s = r$

$y = r+s \rightarrow y_r = 1 \quad y_s = 1$

Plug them in:

$$J = \begin{vmatrix} s & r \\ 1 & 1 \end{vmatrix} = (s \cdot 1) - (r \cdot 1) = \boxed{s - r}$$

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).

First, find the Jacobian:

$$J = \begin{vmatrix} x_u & x_v \\ y_u & y_v \end{vmatrix} = \begin{vmatrix} 1 & 1 \\ 0 & 2v \end{vmatrix} = 2v \cdot 1 - 0 = 2v$$

Substitute $y = v^2$ into the integral.

$$\iint_D v^2 \cdot 2v \, du \, dv = \boxed{\iint_D 2v^3 \, du \, dv}$$