

NAME: (print!) Aditya Sivakumar

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 transformation

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

$$\begin{aligned} x &= rs \\ y &= r + s \end{aligned}$$

$$\frac{\partial(x, y)}{\partial(u, v)} = \begin{vmatrix} s & r \\ r & 1 \end{vmatrix} = \boxed{s - r}$$

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

$$\iint_D y \, dA$$

$$\begin{aligned} x &= u + v \\ y &= v^2 \end{aligned}$$

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

$$\begin{aligned} & \iint_R (v^2)(2v-1) \, dv \, du \\ &= \int_0^6 \int_1^2 (2v^3 - v^2) \, dv \, du \\ &= \int_0^6 \left[\frac{v^4}{2} - \frac{v^3}{3} \right]_1^2 \, du = \end{aligned}$$

$$\begin{aligned} & \int_0^6 \frac{31}{6} \, du \\ &= \frac{31}{6} u \Big|_0^6 = \boxed{31} \end{aligned}$$