

"QUIZ" for Lecture 16

NAME: (print!) Jennifer Gonzalez 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 transformation

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

$$\begin{vmatrix} s & r \\ 1 & 1 \end{vmatrix} = s + r$$

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

$$\int \int_D y \, dA$$

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

$$0 = u + v \quad b = v^2$$

$$0 = u + \sqrt{b}$$

$$(-\sqrt{b}, \sqrt{b})$$

$$1 = u + v \quad 2 = v^2$$

$$1 = u + \sqrt{2}$$

$$1 - \sqrt{2} = u$$

$$(1 - \sqrt{2}, \sqrt{2})$$

$$\int_{1-\sqrt{2}}^{\sqrt{2}} \int_{-\sqrt{b}}^{\sqrt{b}} v^2 \cdot 2v \, du \, dv$$

$$2 \int_{-\sqrt{b}}^{\sqrt{b}} v^3 \, du = 2v^3 u \Big|_{-\sqrt{b}}^{\sqrt{b}} = 2v^3 \sqrt{b} + 2v^3 \sqrt{b} = 4v^3 \sqrt{b}$$

$$4\sqrt{b} \int_{1-\sqrt{2}}^{\sqrt{2}} v^3 = 4\sqrt{b} \cdot \frac{v^4}{4} \Big|_{1-\sqrt{2}}^{\sqrt{2}} = \sqrt{b} \left((\sqrt{2})^4 - (1-\sqrt{2})^4 \right)$$

$$= \sqrt{b} \left(4 - (1-\sqrt{2})^4 \right)$$