MA 213 Worksheet #22

Section 15.9
11/13/18

1 Find the Jacobian of the transformation.

15.9.3 $x = s\cos(t)$ $y = s\sin(t)$

15.9.5 $x = uv$ $y = vw$ $z = wu$

2 *15.9.9* Find the image of the set S under the given transformation.

S is the triangular region with vertices $(0,0), (1,1), (0,1)$

$x = u^2$, $y = v$

3 *15.9.11* A region R in the xy-plane is given. Find equations for a transformation T that maps a rectangular region in S in the uv-plane onto R, where the sides of S are parallel to the u and v axis.

R is bounded by $y = 2x - 1$, $y = 2x + 1$, $y = 1 - x$, $y = 3 - x$

4 *15.9.15* Use the given transformation to evaluate the integral.

$\iint_R (x - 3y)dA$, where R is the triangular region with vertices $(0,0), (2,1)$ and $(1,2)$;
$x = 2u + v$, $y = u + 2v$

5 *15.9.19* Use the transformation to evaluate the integral:

$$\iint_R xy\,dA$$

where R is the region in the first quadrant bounded by the lines $y = x$ and $y = 3x$ and the hyperbolas $xy = 1$, $xy = 3$; $x = \frac{u}{v}$, $y = v$.

6 *15.9.23* Evaluate the integral

$$\iint_R \frac{x - 2y}{3x - y}\,dA$$

by making an appropriate change of variables, where R is the parallelogram enclosed by the lines $x - 2y = 0, x - 2y = 4, 3x - y = 1$, and $3x - y = 8$.