

## CHANGE OF VARIABLES

1. Find the Jacobian of the following transformation.

$$x = 2u - 3v$$

$$y = u + 2v$$

2. Find the Jacobian of the following transformation.

$$x = uv$$

$$y = 4u^2 + 2v^2$$

3. Find the Jacobian of the following transformation.

$$x = 2u + v - w$$

$$y = 3u + 2v + 2w$$

$$z = u + v + w$$

4. Find the area of the ellipse by using a change of variables to transform the ellipse

$$\frac{x^2}{4} + \frac{y^2}{9} = 1 \text{ into a circle.}$$

5. Find the area of the parallelogram with vertices  $(0,0)$ ,  $(1,0)$ ,  $(1,1)$ , &  $(2,1)$  by using a change of variables to transform the parallelogram into a rectangle.