CHANGE OF VARIABLES

1. Find the Jacobian $\dfrac{\partial(x,y)}{\partial(u,v)}$ of the following transformation.

   $x = 2u - 3v$

   $y = u + 2v$

2. Find the Jacobian $\dfrac{\partial(x,y)}{\partial(u,v)}$ of the following transformation.

   $x = uv$

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

3. Find the Jacobian $\dfrac{\partial(x,y,z)}{\partial(u,v,w)}$ 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 $\dfrac{x^2}{4} + \dfrac{y^2}{9} = 1$ into a circle.

5. Find the area of the ellipse by using a change of variables to transform the ellipse $\dfrac{x^2}{36} + 16\dfrac{y^2}{9} = 1$ into a circle.

6. Find the volume of the ellipsoid by using a change of variables to transform the ellipsoid $\dfrac{x^2}{4} + \dfrac{y^2}{9} + \dfrac{z^2}{25} = 1$ into a sphere.

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