1) $G(u,v) = \langle 2u, u+v \rangle$

$$x = 2u \qquad\qquad y = u + v$$

$$u = \frac{x}{2}$$

(b) $R = [0,5] \times [0,7]$

$$0 \leq x \leq 5 \qquad\qquad 0 \leq y \leq 7$$

$$(0,0), \ (0,7), \ (5,0), \ (5,7)$$

$$= (0,0) \ (0,7), \ (10,5)$$

$$(10,12)$$
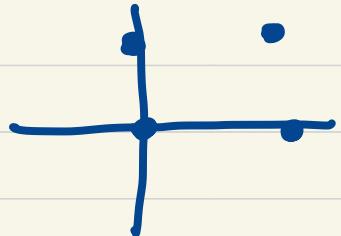
$2u, u+v$

(⑤) $(0,1)$   $(1,0)$   $(1,1)$

$= (0,1)$   $(2,1)$   $(2,2)$

③ $G(u,v) = (u^2, v)$

   $G$ is not one-one

   For one to one, $u \geq 0$   &  $u \leq 0$

(b) Rectangle $[-1,1] \times [-1,1]$

     $(-1,1)$ $(-1,1)$ $(1,-1)$ $(1,1)$

       $(1,1)$   $(1,1)$   $(1,-1)$ $(1,1)$

(c) $(0,0)$ $(1,1)$

(d) $(0,0)$ $(0,1)$ $(1,1)$

$\rightarrow$ $(0,0)$ $(0,1)$ $(1,1)$
Same

13) $G(3u+4v, u-2v)$

$x = 3u + 4v$ $\qquad$ $y = u - 2v$

$$\begin{vmatrix} \partial x/\partial u & \partial x/\partial v \\ \partial y/\partial u & \partial y/\partial v \end{vmatrix}$$

$$\begin{vmatrix} 3 & 4 \\ 1 & -2 \end{vmatrix} = -6-4$$
$$= -10$$

15) $x = r\sin t$

   $y = r - \cos t$

$$\begin{vmatrix} \dfrac{dx}{dr} & \dfrac{dx}{dt} \\[2mm] \dfrac{dy}{dr} & \dfrac{dy}{dt} \end{vmatrix}$$

$$= \begin{vmatrix} \sin t & r\cos t \\[2mm] 1 & r + \sin t \end{vmatrix} \qquad \begin{array}{l} r = 1 \\ t = \pi \end{array}$$

$$= \begin{vmatrix} 0 & -1 \\[2mm] 1 & 1 \end{vmatrix}$$

$$= \quad 7 \ 1$$

17) $x = r \cos \theta$

$y = r \sin \theta$

$\dfrac{30}{\cancel{180}} \Big/ \cancel{6}_1$

$$\begin{vmatrix} \dfrac{dx}{dr} & \dfrac{dx}{d\theta} \\[2mm] \dfrac{dy}{dr} & \dfrac{dy}{d\theta} \end{vmatrix}$$

$r = 4$

$\theta = \pi/6$

$$\begin{vmatrix} \cos\theta & -r\sin\theta \\[2mm] \sin\theta & r\cos\theta \end{vmatrix}$$

$r\cos^2\theta + r\sin^2\theta$

$r = 4$

19) $[0,1] \times [0,1]$

$[0,0] \quad [0,1] \quad [1,0] \quad [1,1]$

$\langle 2,3 \rangle \qquad \langle 4,1 \rangle$

$4u + 2v$

$u + 3v$

23) $G(u,v) = (3u+v, u-2v)$

$R = [0,3] \times [0,5]$

$= (0,0) \quad (0,5) \quad (3,0) \quad (3,5)$

$(0,0), (5,-10), (6,3), (14,-7)$

Area $= 105$