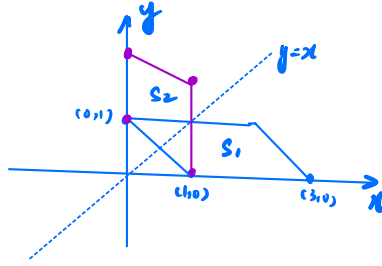


$$\begin{pmatrix} a & b \\ c & d \end{pmatrix}$$

for example  $(1,0)$   $(3,0)$   $(2,1)$   $(0,1)$

when  $b=c=1$  so  $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$

$$\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} 1 & 3 & 2 & 0 \\ 0 & 0 & 1 & 1 \end{pmatrix} = \begin{pmatrix} 0 & 0 & 1 & 1 \\ 1 & 3 & 2 & 0 \end{pmatrix}$$



$$S_1 = 2 \times 1 = 2$$

$(0,1)$   $(0,3)$   $(1,2)$   $(1,0)$

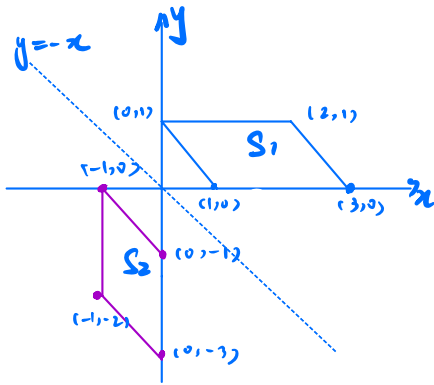
$$S_2 = 2 \times 1 = 2$$

so through the transformation by the matrix, the area of the graph is unchanged.

The transformation of graph matrix  $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$  is the graph reflect by  $y=x$  followed by

when  $b=c=-1$

$$\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix} \begin{pmatrix} 1 & 3 & 2 & 0 \\ 0 & 0 & 1 & 1 \end{pmatrix} = \begin{pmatrix} 0 & 0 & -1 & -1 \\ -1 & -3 & -2 & 0 \end{pmatrix}$$



$(0,-1)$   $(0,-3)$   $(-1,-2)$   $(-1,0)$

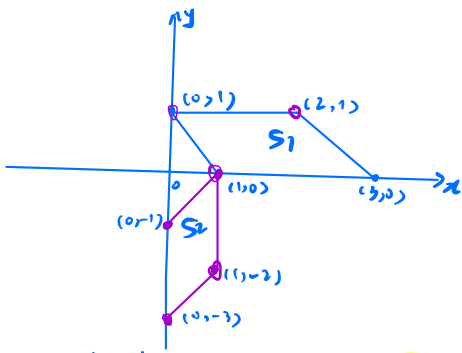
$$S_1 = S_2 = 2$$

The transformation of the graph followed by the matrix

$$\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix} \text{ is reflect in } y=-x$$

when  $b=1$   $c=-1$

$$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix} \begin{pmatrix} 1 & 3 & 2 & 0 \\ 0 & 0 & 1 & 1 \end{pmatrix} = \begin{pmatrix} 0 & 0 & 1 & 1 \\ -1 & -3 & -2 & 0 \end{pmatrix}$$



$(0,-1)$   $(0,-3)$   $(1,-2)$   $(1,0)$

$$S_1 = S_2$$

The transformation of matrix  $\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$  is rotate anticlockwise  $\frac{90^\circ}{2}$  about the origin

when  $b=-1$   $c=1$

The transformation of matrix  $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$  is rotate anticlockwise  $\frac{\pi}{2}$  about the origin

when  $a, b, c, d$  equal to 0 so there are no transformations follow by the zero matrix