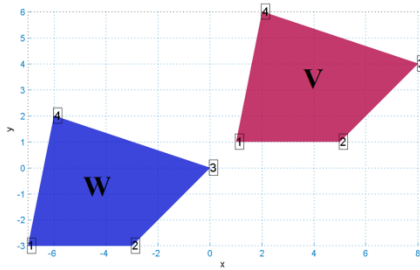
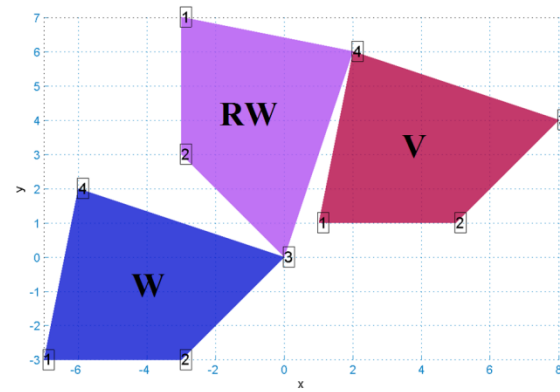


## Transformations *not* about the origin

Consider a 90° clockwise rotation about the point (8,4)



First translate by (-8,-4) to make the rotation point the NEW ORIGIN



$$W = \begin{pmatrix} 1 & 5 & 8 & 2 \\ 1 & 1 & 4 & 6 \end{pmatrix} - \begin{pmatrix} 8 & 8 & 8 & 8 \\ 4 & 4 & 4 & 4 \end{pmatrix} = \begin{pmatrix} -7 & -3 & 0 & -6 \\ -3 & -3 & 0 & 2 \end{pmatrix}$$

Then rotate 90° clockwise about (0,0)

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

Matrix Transformer 2D (mtrans2D) v1.1. Andy French. Nov 2012

Save figure as .png  Label vertices  Auto axis scale

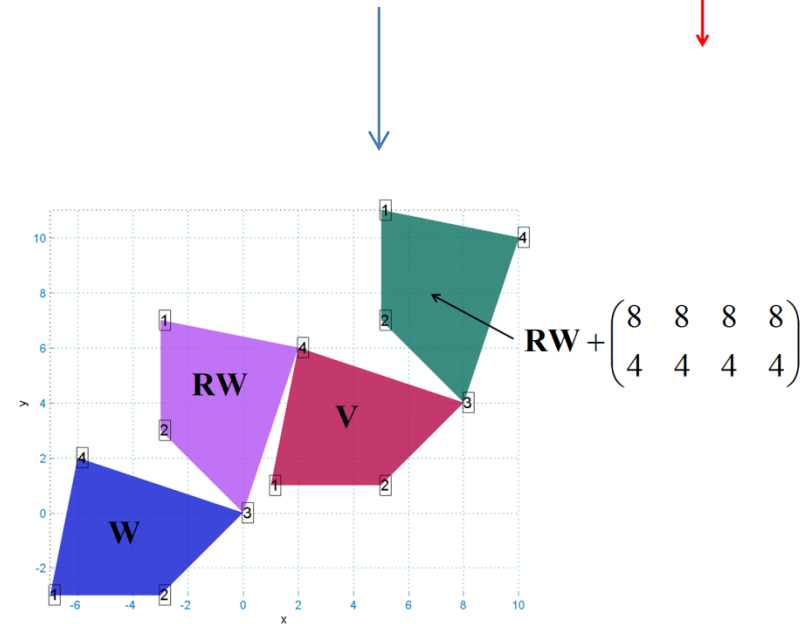
Object: User defined polygon 1 2

Centre (x): 7, Centre (y): 8, Rotation /deg: 0, Aspect ratio: 1

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix} \left\{ \begin{pmatrix} x \\ y \end{pmatrix} - \begin{pmatrix} 8 \\ 4 \end{pmatrix} \right\} + \begin{pmatrix} 8 \\ 4 \end{pmatrix}$$

New coordinates Transformation matrix Old coordinates Translation 1 Translation 2

Transform object Reflection in x axis Iterations 1



Lastly translate by (8,4). The original shape V is now rotated by 90° clockwise about the point (8,4)