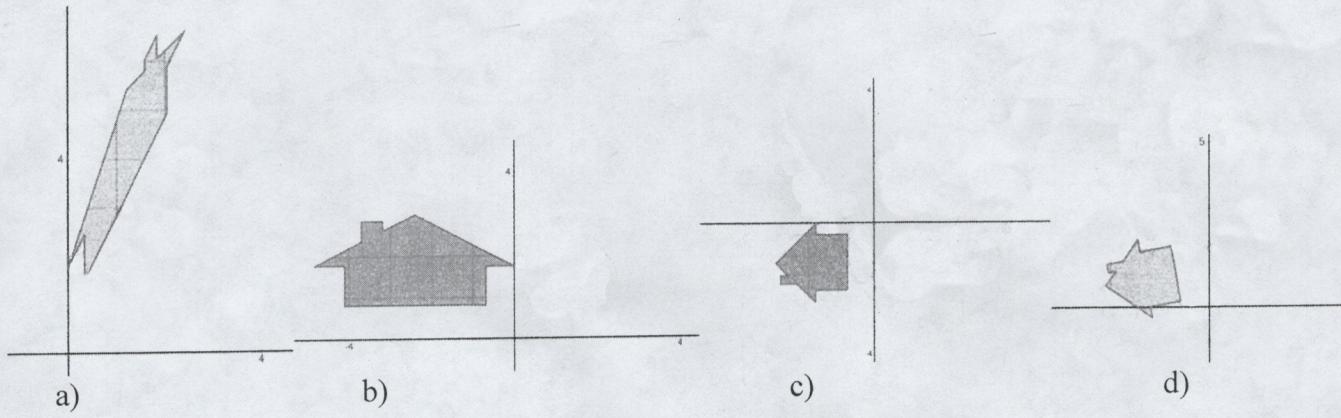


1. Write a matrix that would turn the original house in the 1<sup>st</sup> quadrant into its new image. In some cases you might have to make some approximations which is fine. As long as you're close you'll get full credit. [3 each]



a) \_\_\_\_\_ b) \_\_\_\_\_ c) \_\_\_\_\_ d) \_\_\_\_\_

- e. Write a matrix that would map every point on the house to a point on the line that passes through the origin and  $(4, -3)$  [3]

2. Perform the operation  $(2 + 5i)(3 - 2i)$  using matrices. Show how your answer can be converted back into  $a + bi$  form. [3]

4. Below are generators for two different groups. For each, state i) the transformation(s) represented by the matrix (or matrices); ii) the order (size) of the group and iii) a different group that it is isomorphic to. [12 total] [4 each]

a)  $\begin{bmatrix} \cos 20^\circ & -\sin 20^\circ \\ \sin 20^\circ & \cos 20^\circ \end{bmatrix}$  i) \_\_\_\_\_ ii) \_\_\_\_\_  
iii) \_\_\_\_\_

b)  $\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$  and  $\begin{bmatrix} 1 & -1 \\ 0 & 1 \end{bmatrix}$

i) \_\_\_\_\_ and \_\_\_\_\_ ii) \_\_\_\_\_  
iii) \_\_\_\_\_

5. Express the following as a composition of 2 common matrix transformations. (make sure your order is correct) [4]

$$M = \begin{bmatrix} -\cos 50^\circ & -\sin 50^\circ \\ -\sin 50^\circ & \cos 50^\circ \end{bmatrix} \quad M = \underline{\hspace{10cm}}$$