AI1110 assignment1(ICSE Class 10 2017)

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I. QUESTION (7B):

Use a graph paper for this question (Take $2cms = 1unit$ on both x and y axis)

(1.1) Plot the following points: A(0,4), B(2,3), C(1,1) and D(2,0).

(1.2) Reflect points B, C, D on the y-axis and write down their coordinates. Name the images as B', C', D' respectively.

(1.3) Join the points A, B, C, D, D', C', B' and A in order, so as to form a closed figure. Write down the equation of the line of symmetry of the figure formed.

II. SOLUTION:

(1.1) the plot of all points in last plot section labebled with A,B,C,D

(1.2) Let us use column vectors for points and reflection matrix R.

$$\mathbf{B} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} 1 \\ 1 \end{pmatrix}, \mathbf{D} = \begin{pmatrix} 2 \\ 0 \end{pmatrix}$$

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

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

$$\mathbf{M'} = \mathbf{MR} = \begin{pmatrix} 2 & 1 & 2 \\ 3 & 1 & 0 \end{pmatrix} \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$$

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

$$\mathbf{B'} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}, \mathbf{C'} = \begin{pmatrix} 1 \\ 1 \end{pmatrix}, \mathbf{D'} = \begin{pmatrix} 2 \\ 0 \end{pmatrix}$$

these are the reflected points the columns of matrix M'

(1.3) joining the points in order A, B, C, D, D', C', B' and A gives a polygon which is shown below. As reflection of B,C,D are B',C',D' wrt y-axis it can be said that the line of symmetry is y-axis and its equation is
line of symmetry equation:

$$x = 0.$$

III. PLOT:

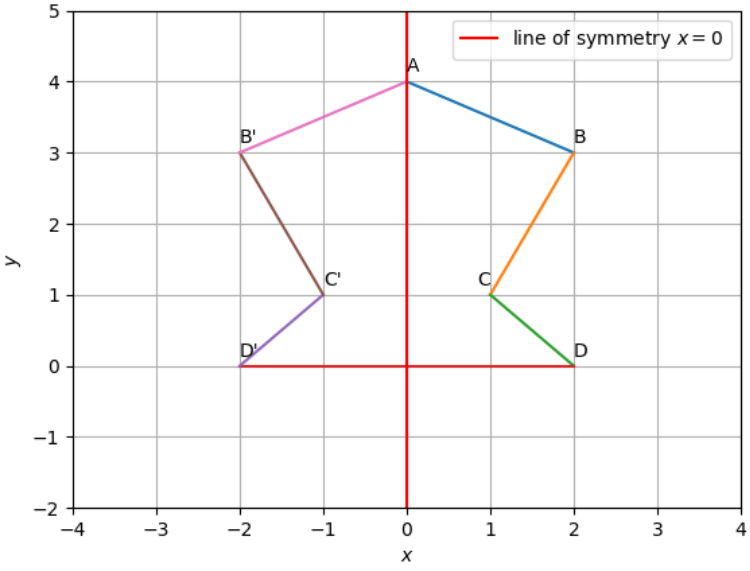

Fig. 1. Plot of all points and figure formed