Assignment 2

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question(iv):
Show that $\mathbf{A} + \mathbf{A}'$ is symmetric matrix.if
$\mathbf{A} = \begin{pmatrix} 2 & 4 \\ 3 & 5 \end{pmatrix}$
solution:
given,

$$\mathbf{A} = \begin{pmatrix} 2 & 4 \\ 3 & 5 \end{pmatrix} \tag{1}$$

$$\implies \mathbf{A}' = \begin{pmatrix} 2 & 3 \\ 4 & 5 \end{pmatrix} \tag{2}$$

$$\mathbf{A} + \mathbf{A}' = \begin{pmatrix} 2 & 4 \\ 3 & 5 \end{pmatrix} + \begin{pmatrix} 2 & 3 \\ 4 & 5 \end{pmatrix} \tag{3}$$

$$\implies \mathbf{A} + \mathbf{A}' = \begin{pmatrix} 2+2 & 4+3 \\ 3+4 & 5+5 \end{pmatrix} \tag{4}$$

$$\implies \mathbf{A} + \mathbf{A}' = \begin{pmatrix} 4 & 7 \\ 7 & 10 \end{pmatrix} \tag{5}$$

A matrix $\mathbf{R}$ is symmetric if

$$\mathbf{R} = \mathbf{R}' \tag{6}$$

let

$$\mathbf{A} + \mathbf{A}' = \mathbf{R} \tag{7}$$

Now,we have to find $\mathbf{R}'$

$$\mathbf{R} = \begin{pmatrix} 4 & 7 \\ 7 & 10 \end{pmatrix} \tag{8}$$

$$\implies \mathbf{R}' = \begin{pmatrix} 4 & 7 \\ 7 & 10 \end{pmatrix} \tag{9}$$

$$\implies \mathbf{R} = \mathbf{R}' \tag{10}$$

So, $\mathbf{R}$ is symmetric matrix
$\therefore \mathbf{A} + \mathbf{A}'$ is symmetric matrix