

It will be solved in two steps:

1st step

i) $e_2 = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$ is transformed to $e_2 - 0.5e_1$ i.e.

$$T(e_2) = \begin{pmatrix} 0 \\ 1 \end{pmatrix} - 0.5 \begin{pmatrix} 1 \\ 0 \end{pmatrix} = \begin{pmatrix} 0 \\ 1 \end{pmatrix} - \begin{pmatrix} 0.5 \\ 0 \end{pmatrix} = \begin{pmatrix} -0.5 \\ 1 \end{pmatrix}$$

And

ii) $e_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$ is unchanged i.e. $T(e_1) = e_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$

∴ transformation matrix: $A = (T(e_1) \ T(e_2)) = \begin{pmatrix} 1 & -0.50 \\ 0 & 1 \end{pmatrix}$

2nd steps

Now the reflection about $y - axis$ is given by the matrix: $\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$.

∴ Required transformation:

$$\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix} A = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & -0.50 \\ 0 & 1 \end{pmatrix} = \begin{pmatrix} -1 & 0.5 \\ 0 & 1 \end{pmatrix}$$