

Step-1

Let $A = S\Lambda S^{-1}$. Then to determine eigen value matrix for $A + 2I$, and eigen vector matrix. Also, fill in the following blanks:

$$A + 2I = () () ()^{-1}$$

Step-2

To find the eigen value matrix do the following calculations:

$$A = S\Lambda S^{-1}$$

$$\Lambda = S^{-1}AS$$

Now, for $A + 2I$ the eigen value matrix will be as follows:

$$\begin{aligned} S^{-1}(A + 2I)S &= (S^{-1}A + 2S^{-1}I)S \\ &= S^{-1}AS + 2S^{-1}S \\ &= \Lambda + 2I \end{aligned}$$

Therefore, eigen value matrix for $A + 2I$ is: $\Lambda + 2I$, and eigen vector matrix will be S

Also, $A + 2I$ can be written as follows:

$$A + 2I = (S)(\Lambda + 2I)(S)^{-1}$$

If the above relation is checked by substituting all the values, it is found to be true.