

Step-1

Given that x_1, x_2, x_3 are the columns of a matrix X where

$$Ax_1 = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}, Ax_2 = \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}, Ax_3 = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}.$$

We have to find AX .

Step-2

Let $X = \begin{bmatrix} x_1 & x_2 & x_3 \end{bmatrix}$.

Now $AX = A \begin{bmatrix} x_1 & x_2 & x_3 \end{bmatrix}$

$$= \begin{bmatrix} Ax_1 & Ax_2 & Ax_3 \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$= I$$

Step-3

Hence A times $X = \begin{bmatrix} x_1 & x_2 & x_3 \end{bmatrix}$ will be the Identity matrix where $I = \begin{bmatrix} Ax_1 & Ax_2 & Ax_3 \end{bmatrix}$.