

Step-1

We have to compute the products by working a column at a time.

$$(a) \begin{bmatrix} 4 & 1 \\ 5 & 1 \\ 6 & 1 \end{bmatrix} \begin{bmatrix} 1 \\ 3 \end{bmatrix} = 1 \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix} + 3 \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$$

$$= \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix} + \begin{bmatrix} 3 \\ 3 \\ 3 \end{bmatrix}$$

$$= \begin{bmatrix} 7 \\ 8 \\ 9 \end{bmatrix}$$

Step-2

$$(b) \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix} \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix} = 0 \begin{pmatrix} 1 \\ 4 \\ 7 \end{pmatrix} + 1 \begin{pmatrix} 2 \\ 5 \\ 8 \end{pmatrix} + 0 \begin{pmatrix} 3 \\ 6 \\ 9 \end{pmatrix}$$

$$= \begin{pmatrix} 2 \\ 5 \\ 8 \end{pmatrix}$$

Step-3

$$(c) \begin{pmatrix} 4 & 3 \\ 6 & 6 \\ 8 & 9 \end{pmatrix} \begin{pmatrix} \frac{1}{2} \\ \frac{1}{3} \end{pmatrix} = \frac{1}{2} \begin{pmatrix} 4 \\ 6 \\ 8 \end{pmatrix} + \frac{1}{3} \begin{pmatrix} 3 \\ 6 \\ 9 \end{pmatrix}$$

$$= \begin{pmatrix} 2 \\ 3 \\ 4 \end{pmatrix} + \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$$

$$= \begin{pmatrix} 3 \\ 5 \\ 7 \end{pmatrix}$$

