Evaluate the vectors (2i - 3j).[(I +j - k) x (3i - k)]

7

4

6

2

Solution

Let's calculate the cross product:

$$[(i + j - k) \times (3i - k)] = \begin{vmatrix} \boldsymbol{i} & \boldsymbol{j} & \boldsymbol{k} \\ 1 & 1 & -1 \\ 3 & 0 & -1 \end{vmatrix} = 1 \cdot (-1) \cdot \boldsymbol{i} + (-1) \cdot 3 \cdot \boldsymbol{j} - 3 \cdot 1 \cdot \boldsymbol{k} - 1 \cdot (-1) \cdot \boldsymbol{j}$$
$$= -\boldsymbol{i} - 2\boldsymbol{j} - 3\boldsymbol{k}$$

Let's calculate the product:

$$(2\boldsymbol{i} - 3\boldsymbol{j}) \cdot [(\boldsymbol{i} + \boldsymbol{j} - \boldsymbol{k}) \times (3\boldsymbol{i} - \boldsymbol{k})] = (2\boldsymbol{i} - 3\boldsymbol{j}) \cdot (-\boldsymbol{i} - 2\boldsymbol{j} - 3\boldsymbol{k}) = -2 + 6 = 4$$

Answer: 4