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If $A = 3i + 4j - 6k$, $B = 5i - 11j + 2k$, $C = 7i - 7j + k$ find

① $A \cdot C + B \cdot C$

ans $A \cdot C = (3i + 4j - 6k)(7i - 7j + k)$

$A \cdot C = (3 \times 7)i \ (4 \times -7)j \ (-6 \times 1)k$

$A \cdot C = 21i - 28j - 6k$

$B \cdot C = (5i - 11j + 2k)(7i - 7j + k)$

$B \cdot C = (5 \times 7)i \ (-11 \times -7)j \ (2 \times 1)k$

$B \cdot C = 35i + 77j + 2k$

$A \cdot C + B \cdot C = (21i - 28j - 6k) + (35i + 77j + 2k)$

$A \cdot C + B \cdot C = (21 + 35)i \ (-28 + 77)j \ (-6 + 2)k$

$A \cdot C + B \cdot C = \underline{56i + 49j - 4k}$

② $(A - B) \cdot C$

ans $(A - B) = (3i + 4j - 6k) - (5i - 11j + 2k)$

$A - B = (3 - 5)i \ (4 - (-11))j \ (-6 - 2)k$

$A - B = -2i + 15j - 8k$

$(A - B) \cdot C = (-2i + 15j - 8k) \times (7i - 7j + k)$

$(A - B) \cdot C = (-2 \times 7)i \ (15 \times -7)j \ (-8 \times 1)k$

$(A - B) \cdot C = \underline{-14i - 105j - 8k}$

A·(B×C)

and (B×C)

$$= \begin{vmatrix} i & j & k \\ 5 & -11 & 2 \\ 7 & -7 & 1 \end{vmatrix}$$

$$= i\begin{vmatrix} -11 & 2 \\ -7 & 1 \end{vmatrix} - j\begin{vmatrix} 5 & 2 \\ 7 & 1 \end{vmatrix} + k\begin{vmatrix} 5 & -11 \\ 7 & -7 \end{vmatrix}$$

$i = (-11 + 14) \quad -j\,(5 - 14) \quad +k\,(-35 + 77)$

$(B\times C) \quad 3i \quad +9j \quad +42k$

$A\cdot(B\times C) = (3i + 4j - 6k) \times (3i + 9j + 42k)$

$A\cdot(B\times C) = (3\times 3)i \quad (4\times 9)j \quad (-6\times 42)k$

$A\cdot(B\times C) = 9i \quad +36j \quad -252k$

$\therefore A(B\times C) = 9i + 36j - 252k$