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$A = 3i + 4j - 6k$

$B = 5i - 11j + 2k$

$C = 7i - 7j + k$

1) $A \cdot C + B \cdot C = ?$

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

$= 21 - 28 - 6$

$= -13$

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

$= 35 + 77 + 2$

$= 144$

$\therefore A \cdot C + B \cdot C = -13 + 144$

$= 131$

2) $(A - B) \cdot C$

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

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

$(A - B) \cdot C$

$= (-2i + 15j - 8k) \cdot (7i - 7j + k)$

$= -14 - 105 - 8$

$= -127$

3) $A \cdot (B \times C)$

$$(B \times C) = \begin{vmatrix} i & j & k \\ 5 & -11 & 2 \\ 7 & -7 & 1 \end{vmatrix}$$

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

$i(-35+77) - j(5-14) + k(-35+77)$

$= 42i + 9j - 42k$

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

$= 126 + 36 - 252$

$= -90$