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

i) $-3A + 7B - 8C$

$-3(2i - j) + 7(3i + j - 11k) - 8(4i + 4j - 5k)$

$= -6i - 3j + 21i + 7j - 77k - 24i + 24j - 40k$

$= -9i + 28j - 117k$

iii) $A \times (B \times C)$

$= (B \times C) = \begin{vmatrix} 3i + j - 11k \\ 4i + 4j - 5k \end{vmatrix}$ $\begin{vmatrix} i & j & k \\ 3 & 1 & -11 \\ 4 & 4 & -5 \end{vmatrix}$

$= i\begin{vmatrix} 1 & -11 \\ 4 & -5 \end{vmatrix} - j\begin{vmatrix} 3 & -11 \\ 4 & -5 \end{vmatrix} + k\begin{vmatrix} 3 & 1 \\ 4 & 4 \end{vmatrix}$

$i(-5 + 44) - j(-15 + 44) + k(12 - 4)$

$39i - 29j + 8k$

$A \times (B \times C) = 2i - j \times 39i - 29j + 8k$ $\begin{vmatrix} i & j & k \\ 2 & -1 & 0 \\ 39 & -29 & 8 \end{vmatrix}$

$= i\begin{pmatrix} -1 & 0 \\ -29 & 8 \end{pmatrix} - j\begin{pmatrix} 2 & 0 \\ 39 & 8 \end{pmatrix} + k\begin{pmatrix} 2 & -1 \\ 39 & -29 \end{pmatrix}$

$= i(-8 + 0) - j(16 - 0) + k(-58 + 39)$

$= -8 - 16 - 19$

$= -27$

iv) $(3A \times B) \cdot (A \times 2B)$

$3A = 6i - 3j$

$3A \times B = \begin{vmatrix} i & j & k \\ 6 & -3 & 0 \\ 3 & 1 & -11 \end{vmatrix}$

$i\begin{pmatrix} -3 & 0 \\ 1 & -11 \end{pmatrix} - j\begin{pmatrix} 6 & 0 \\ 3 & -11 \end{pmatrix} + k\begin{pmatrix} 6 & -3 \\ 3 & 1 \end{pmatrix}$

$i(33 - 0) - j(-66 - 0) + k(6 + 9)$

$= 33i + 66j + 15k$

$2B = 6i + 2j - 22k$

$A \times 2B = \begin{vmatrix} i & j & k \\ 2 & -1 & 0 \\ 6 & 2 & -22 \end{vmatrix}$

$i\begin{pmatrix} -1 & 0 \\ 2 & -22 \end{pmatrix} - j\begin{pmatrix} 2 & 0 \\ 6 & -22 \end{pmatrix} + k\begin{pmatrix} 2 & -1 \\ 6 & 2 \end{pmatrix}$

$i(22 - 0) - j(-44 - 0) + k(4 + 6)$

$= 22i + 44j + 10k$

6i

$(3A \times B) \cdot (A \times 2B)$

$= 6i * 2j - 22k \cdot 22i + 44j + 10k$

$= 132 + 88 - 220$

$= 0$

v) $A - 2B - C$

$2i - j - 6i + 2j - 22k + 4i + 4j - 5k$

$= 5j - 27k$

2) Perpendicular vectors is a vector that forms a right angle

Coplanar vectors are the the vector which lie in the same plane formed by two axes in the coordinate geometry