

NAME: ISAAC ENG GRACE

DEPARTMENT: BIOMEDICAL ENGINEERING

MATRICNUMBER: 1911ENH1081004

MAT 102 ASSIGNMENT

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

(i) $A \cdot C + B \cdot C$

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

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

Solution

$$i) A \cdot C = A_x C_x + A_y C_y + A_z C_z$$

$$= 3 \times 7 + (4 \times -7) + (-6 \times 1)$$

$$= 21 - 28 - 6$$

$$= -13$$

$$\rightarrow B \cdot C = B_x C_x + B_y C_y + B_z C_z$$

$$= 5 \times 7 + (-11 \times -7) + 2 \times 1$$

$$= 35 - 77 + 2$$

$$= -40$$

$$A \cdot C + B \cdot C = -13 - 40$$

$$= -53$$

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

$$= 3i + 4j - 6k - 5i + 11j - 2k$$

$$= -2i + 15j - 8k = (-2, 15, -8)$$

$$(A - B) \cdot C = (-2, 15, -8) \cdot (7, -7, 1) = (-2)(7) + (15)(-7) + (-8)(1)$$

$$= -14 - 105 - 8$$

$$= -127$$

(iii) $A \cdot (B - C) =$

$$\begin{vmatrix} 3 & 4 & -6 \\ 5 & -11 & 2 \\ 7 & -7 & 1 \end{vmatrix}$$

$$= +3 \begin{vmatrix} -11 & 2 \\ -7 & 1 \end{vmatrix} - 4 \begin{vmatrix} 5 & 2 \\ 7 & 1 \end{vmatrix} + (-6) \begin{vmatrix} 5 & -11 \\ 7 & -7 \end{vmatrix}$$

$$= 3(-11 \times 1 - 14) - 4(5 - 14) - 6(-35 + 77)$$

$$= 9 + 36 - 252$$

$$= -207$$