

PINNICK ITSE DRITSETSERUNDE

CHEMICAL ENGINEERING

19/ENG01/013

SERIAL NUMBER: 48

MAT 102 ASSIGNMENT

Questions

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

1  $A \cdot C + B \cdot C$

2  $(A - B) \cdot C$

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

Solutions

1  $A \cdot C = (3i + 4j - 6k) \cdot (7i - 7j + k) = 21 - 28 - 6 = -13$   
 $B \cdot C = (5i - 11j + 2k) \cdot (7i - 7j + k) = 35 + 77 + 2 = 114$   
 $A \cdot C + B \cdot C = -13 + 114 = 101$  //

2  $A - B = (3i + 4j - 6k) - (5i - 11j + 2k) = -2i + 15j - 8k$   
 $(A - B) \cdot C = (-2i + 15j - 8k) \cdot (7i - 7j + k)$   
 $(A - B) \cdot C = -14 - 105 - 8$   
 $\therefore (A - B) \cdot C = -127$  //

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

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

$i(-11 + 14) - j(5 - 14) + k(-35 + 77)$   
 $\therefore B \times C = 3i + 9j + 42k$

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

$$A \cdot (B \times C) = 9 + 36 - 252$$

$$\therefore A \cdot (B \times C) = -207 //$$