

19/Eng02/019

1st chapter
Semester Engineering
19/Eng02/019
maths 102

$$1. \quad A = 2i - 3j$$

$$B = 3i + 5j - 11k$$

$$C = 4i + 4j - 5k$$

$$1) \quad -3(2i - 3j) + 7(3i + 5j - 11k) - 8(4i + 4j - 5k)$$

$$= -6i + 9j + 21i + 35j - 77k - 32i - 32j + 40k$$

$$= -6i + 21i - 32i + 9j + 35j - 32j - 77k + 40k$$

$$= -17i - 22j - 37k$$

$$11) \quad K = 2A - 4B - C$$

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

$$K = 4i - 6j + 12i - 44j - 44k - 4i - 4j + 51k$$

$$K = 4i + 12i - 4i - 6j - 44j - 4j - 44k + 51k$$

$$|K| = \frac{(2) - 2 - 39}{\sqrt{(2)^2 + (-2)^2 + (-39)^2}}$$

$$= \frac{144 + 4 + 1521}{\sqrt{1669}}$$

$$= 40.85$$

$$L = \cos \alpha = \frac{12}{40.85} = 0.2938$$

$$m = \cos \beta = \frac{-2}{40.85} = -0.0490$$

$$n = \cos \gamma = \frac{-39}{40.85} = -0.9547$$

$$11) \quad A \times (B \times C)$$

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

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

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

$$= 39i - 29j + 8k$$

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

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

$$= i(-8+0) - j(16+0) + k(-58+31)$$

$$= -8i - 16j - 27k$$

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

$$* 3A = 3(2i - j)$$

$$= 6i - 3j$$

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

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

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

$$= 33i + 66j + 15k$$

$$* 2B = 2(3i + j - 11k)$$

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

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

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

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

$$= 22i + 44j + 10k$$

$$(3A \times B) \cdot (A \times 2B) = 726 + 2904 + 150$$

$$= 3780$$