$2B = 2(3i + j - 11k) = 6i + 2j - 22k$

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

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

$\Rightarrow 33i + 66j + 15k$

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

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

$\Rightarrow 22i + 44j + 10k$

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

$= (33 \times 22) + (66 \times 44) + (15 \times 10) = 3780$

vi) $A - 2B - C$

$\Rightarrow (2i - j) - (6i + 2j - 22k) - (4i + 4j - 5k)$

$\Rightarrow -8i - 7j + 27k$

2. Two vectors A and B are said to be perpendicular if their Scalar product is equal to zero

- Three vectors A, B and C are said to be Coplanar if their triple Scalar product $[A \cdot (B \times C)]$ is equal to zero

Joseph Martins Chiboueze

Course: Mat 102

DEPT: Computer Engineering

MAT NO: 19/Eng02/023

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

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

$-3A = -3(2i - j) = -6i + 3j$

$7B = 7(3i + j - 11k) = 21i + 7j - 77k$

$-8C = -8(4i + 4j - 5k) = -32i - 32j + 40k$

$\therefore -3A + 7B - 8C = -17j - 22j - 37k$

ii $k = 2A + 4B - C$

$2A = 2(2i - j) = 4i - 2j$

$4B = 4(3i + j - 11k) = 12i + 4j - 44k$

$\therefore 2A + 4B - C \Rightarrow 12i - 2j - 39k$

$|k| \quad \sqrt{(12)^2 + (-2)^2 + (-39)^2} = \sqrt{1669} \Rightarrow 40.85$

$\therefore$ The direction Cosines of k are :

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

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

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

iii $A \times B \times C \Rightarrow A \times B = \begin{vmatrix} i & j & k \\ 2 & -1 & 0 \\ 3 & 1 & -11 \end{vmatrix}$

$= i(11 - 0) - j(-22 - 0) + k(2 + 3)$

$= 11i + 22j + 5k$

$A \times B \times C \quad \begin{vmatrix} i & j & k \\ 11 & 22 & 5 \\ 4 & 4 & -5 \end{vmatrix}$

$= i(-110 - 20) - j(-55 - 20) + k(44 - 88)$

$= -130i + 75j - 44k$

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

$3A = 3(2i - j) = 6i - 3j$