Name: [illegible]
Matric no: [illegible]
Dept: Computer Engineering

1. If $A = 2i + j - 2k$, $B = 6i - 4j + k$, $C = i - 2k$ find:

a) $(A - 2B) \times C$

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

$= 6i - 4j + 2k$

$\therefore (2i + j - 2k) - (6i - 4j + 2k) \times i - 2k$

$(-2i + 5j - 4k) \times i - 2k$

$= \begin{vmatrix} i & j & k \\ -2 & 5 & -4 \\ 1 & 0 & -2 \end{vmatrix}$

$= i \begin{vmatrix} 5 & -4 \\ 0 & -2 \end{vmatrix} - j \begin{vmatrix} -2 & -4 \\ 1 & -2 \end{vmatrix} + k \begin{vmatrix} -2 & 5 \\ 1 & 0 \end{vmatrix}$

$= i(-10 - 0) - j(4 - (-4)) + k(-2 - 5)$

$= -10i - 8j + 7k$

$\therefore (A - 2B) \times C = -10i - 8j - 7k$

b) $A \times (2C \times 3B)$

$2C = 2(C - 2k) = 2i - 4k$

$3B = 3(3i - 2j + k) = 9i - 6j + 3k$

$2C \times 3B = \begin{vmatrix} i & j & k \\ 2 & 0 & -4 \\ 9 & -6 & 3 \end{vmatrix}$

$= i \begin{vmatrix} 0 & -4 \\ -6 & 3 \end{vmatrix} - j \begin{vmatrix} 2 & -4 \\ 9 & 3 \end{vmatrix} + k \begin{vmatrix} 2 & 0 \\ 9 & -6 \end{vmatrix}$

$= i(24) - j(6 - 36) + k(-12)$

$24i - 42j + 12k$

$\therefore A \times (2c \times 3b)$

$= 4i + j - 2k \times 24i + 42j - 12k$

$= \begin{vmatrix} i & j & k \\ 1 & 1 & -2 \\ 24 & 42 & -12 \end{vmatrix}$

$= i\begin{vmatrix} 1 & -2 \\ 42 & -12 \end{vmatrix} - j\begin{vmatrix} 4 & -2 \\ 24 & -12 \end{vmatrix} + k\begin{vmatrix} 4 & 1 \\ 24 & 42 \end{vmatrix}$

$= i(-12 - (-84)) - j(-48 - (-48)) + k(168 - 24)$

$= 72i + 144k$

2. $A = 2i - 6j - 3k$

$B = 4i + 2j - k$

$C = i - 3j - 2k$ find the value of p

$A \cdot (B \times C) = 0$

$2i - 6j - 3k \cdot \begin{vmatrix} i & j & k \\ 4 & 3 & -1 \\ 1 & -3 & -2 \end{vmatrix} =$

$2\begin{vmatrix} 3 & -1 \\ -3 & -2 \end{vmatrix} + 6\begin{vmatrix} 4 & -1 \\ 1 & -2 \end{vmatrix} - 3\begin{vmatrix} 4 & 3 \\ 1 & -3 \end{vmatrix}$

$2(-6 - 3) + 6(-8 + 1) - 3(-12 - 3)$

$= 2(-9) + 6(-7) - 3(-15)$

$= -18 + (-42) - (-45)$

$-18 - 42 + 45 = 0$

$\frac{-9p}{-9} - \frac{9}{-9} = 0$

$p = -\frac{1}{3}$