Name: Okafor Tochukwu Chukwuemeka
Department: Mechanical Engineering
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Assignment

1) $\underline{A} = 4i + j - 2k$
$\underline{B} = 3i - 2j + k$
$\underline{C} = i - 2k$

a) $(\underline{A} - 2\underline{B}) \times \underline{C}$

$\underline{A} - 2\underline{B} = 4i + j - 2k - 2(3i - 2j + k)$
$= 4i + j - 2k - 6i + 4j - 2k$
$= -2i + 5j - 4k$

$(\underline{A} - 2\underline{B}) \times \underline{C} = \begin{vmatrix} i & j & k \\ -2 & 5 & -4 \\ 1 & 0 & -2 \end{vmatrix}$

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

$= i(-10 + 0) - j(4 + 4) + k(0 - 5)$
$= -10i - 8j - 5k$

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

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

$= i(0 + 24) - j(6 + 36) + k(-12 + 0)$
$= -24i - 42j - 12k$

$\underline{A} \times (2\underline{C} \times 3\underline{B}) = \begin{vmatrix} i & j & k \\ 4 & 1 & -2 \\ -24 & -42 & -12 \end{vmatrix}$

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

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

$= -96i + 96j - 144k$

2) $\vec{A} = Pi - 6j - 3k$

$\vec{B} = 4i + 3j - k$

$\vec{C} = i - 3j + 2k$

$\vec{A} \cdot (\vec{B} \times \vec{C}) = \begin{vmatrix} P & -6 & -3 \\ 4 & 3 & -1 \\ 1 & -3 & 2 \end{vmatrix} = 0$ (− + −)

$0 = P\begin{vmatrix} 3 & -1 \\ -3 & 2 \end{vmatrix} + 6\begin{vmatrix} 4 & -1 \\ 1 & 2 \end{vmatrix} - 3\begin{vmatrix} 4 & 3 \\ 1 & -3 \end{vmatrix}$

$0 = P(6-3) + 6(8+1) - 3(-12-3)$

$0 = 3P + 54 + 45$

$0 = 3P + 99$

$P = -33$