

Serial No: 130

ONUNKWO DECLAN OLISAEMEKA
COMPUTER ENGINEERING (19/ENG02/05A)
MAT 102 Assignment
5/5/2020

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

finding $2B$, $B = 3i - 2j + k$

$\therefore 2B = 6i - 4j + 2k$

$(A - 2B) = (4i + j - 2k) - (6i - 4j + 2k)$

$A - 2B = -2i + 5j - 4k$

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

	i	$-j$	k
	-2	5	-4
	1	0	-2

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

$(-10 - 0)i \quad - (4 + 4)j \quad (0 - 5)k$

$-10i \quad -8j \quad -5k$

$(A - 2B) \times C = -10i - 8j - 5k$

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

$C = i - 2k$, $\therefore 2C = 2i - 4k$

$B = 3i - 2j + k$, $\therefore 3B = 9i - 6j + 3k$

$2C \times 3B \Rightarrow$

	i	$-j$	k
	2	0	-4
	9	-6	3

$$\begin{array}{l} \left| \begin{array}{cc|c} 0 & -4 & i \\ -6 & 3 & \end{array} \right| \quad - \left| \begin{array}{cc|c} 2 & -4 & j \\ 9 & 3 & \end{array} \right| \quad \left| \begin{array}{cc|c} 2 & 0 & k \\ 9 & -6 & \end{array} \right| \\ (0 + 24)i \quad - (6 + 36)j \quad (-12 - 0)k \end{array}$$

$$2C \times 3B = 24i - 42j - 12k$$

$$A = 4i + j - 2k$$

$$\therefore A \times (2C \times 3B) \Rightarrow \begin{array}{ccc|c} & i & -j & k \\ & 4 & 1 & -2 \\ & 24 & -42 & -12 \end{array}$$

$$\begin{array}{l} \left| \begin{array}{cc|c} 1 & -2 & i \\ -42 & -12 & \end{array} \right| \quad - \left| \begin{array}{cc|c} 4 & -2 & j \\ 24 & -12 & \end{array} \right| \quad \left| \begin{array}{cc|c} 4 & 1 & k \\ 24 & -42 & \end{array} \right| \\ (-12 - 84)i \quad - (-48 + 48)j \quad (-168 - 24)k \\ -96i \quad -0j \quad -192k \end{array}$$

$$A \times (2C \times 3B) = -96i - 192k$$

2 for A, B and C to be Coplanar,

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

$$A = 4i - 6j - 3k$$

$$B = 4i + 3j - k$$

$$C = i - 3j + 2k$$

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

$$\begin{array}{ccc|c} & i & -j & k \\ & 4 & -6 & -3 \\ & 4 & 3 & -1 \\ & 1 & -3 & 2 \end{array} = 0$$

$$\begin{array}{l} P \left| \begin{array}{cc|c} 3 & -1 & 6 \\ -3 & 2 & 1 \end{array} \right| \quad \left| \begin{array}{cc|c} 4 & -1 & -3 \\ 1 & 2 & 3 \end{array} \right| \quad = 0 \\ P(6 - 3) \quad 6(8 + 1) \quad -3(-12 - 3) = 0 \end{array}$$

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

$$P(3)^2 + 6(9) - 3(-15) = 0$$

$$3P + 54 + 45 = 0$$

$$3P + 99 = 0$$

$$3P = -99$$

$$P = \frac{-99}{3}$$

$$P = -33$$