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

$-3A + 7B - 8C$

$$= -3(2i - j) + 7(3i + j - 11k) - 8(4i + 4j - 5k)$$

$$= -6i + 3j + 21i + 7j - 77k - 32i - 32j + 40k$$

$$= -6i + 21i - 32i + 3j + 7j - 32j - 77k + 40k$$

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

2 $K = 2A + 4B - C$

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

$$= 4i - 2j + 12i + 4j - 44k - 4i - 4j + 5k$$

$$= 4i + 12i - 4i - 2j + 4j - 4j - 44k + 5k$$

$$= 12i - 2j - 39k //$$

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

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

$$\cos \beta = \frac{-2}{40.85} \Rightarrow -0.5149$$

3 $A \times (B \times C)$ $\cos \gamma = \frac{-39}{40.85} \Rightarrow -0.9547$

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

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

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

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

Q11) continued

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

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

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

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4. $(3A \times B) \cdot (A \times 2B)$

$$3A \times B = 3(2i - j) = 6i - 3j$$

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

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

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

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

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

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

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

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

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

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

$$v \quad A - 2B - C$$

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

$$= -8i - 7j + 27k$$

2 Two Vectors A and B are said to be perpendicular if the scalar product is equal to zero.

— Three vectors A, B, C are said to be coplanar - if their triple scalar product $[A \cdot (B \times C)]$ is equal to zero.