

Name: Ced' Ugho Fortune  
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 Department: Computer Science      Matric No: 191001083

(1)  $A = 3i + 4j - 2k$   
 $B = i + 2j + 7k$   
 $C = 9i - 4j + 6k$

Soln.

Find angle between A and C.

$\vec{A} \cdot \vec{C} = (3i + 4j - 2k) \cdot (9i - 4j + 6k)$   
 $27 - 28 - 12$

$\vec{A} \cdot \vec{C} = -13$

$\cos \theta = \frac{\vec{A} \cdot \vec{C}}{|\vec{A}| |\vec{C}|}$

$|\vec{A}| = \sqrt{3^2 + 4^2 - 2^2}$   
 $\sqrt{9 + 16 - 4} = \sqrt{21}$

$|\vec{C}| = \sqrt{9^2 + 6^2 + 6^2} = \sqrt{81 + 36 + 36}$

$\sqrt{153} = \sqrt{9 \cdot 17} = 3\sqrt{17}$

$\cos \theta = \frac{-13}{\sqrt{21} \cdot 3\sqrt{17}} = \frac{-13}{3\sqrt{357}}$

$\cos^{-1}(-0.143) = 98.2^\circ$

Board:

W.B.C

18/10/1

$$\cos(\theta) = \frac{a \cdot b}{|a| |b|} = \frac{0 \cdot 1 + 1 \cdot 1}{\sqrt{1+0} \sqrt{1+1}} = \frac{1}{\sqrt{2}}$$

$$\theta = \cos^{-1}\left(\frac{1}{\sqrt{2}}\right) = 45^\circ$$

$$B = \sqrt{1^2 + 2^2 + 1^2} = \sqrt{1+4+1} = \sqrt{6}$$

$$C = \sqrt{1^2 + 1^2 + 1^2} = \sqrt{1+1+1} = \sqrt{3}$$

$$\cos \theta = \frac{B \cdot C}{|B| |C|} = \frac{2 \cdot 3}{\sqrt{6} \sqrt{3}} = \frac{6}{\sqrt{18}} = \frac{6}{3\sqrt{2}} = \frac{2}{\sqrt{2}} = \sqrt{2}$$

$$\cos^{-1}(\sqrt{2}) = \cos^{-1}(1.414) = \text{Not possible}$$

QD

Unit vector in the direction of A+B+C

QD

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

$$|A+B+C| = \sqrt{1^2 + 1^2 + 1^2} = \sqrt{3}$$

$$A+B+C = (3+1+2)i + (4+2+1)j + (-2+1+3)k = 6i + 7j + 2k$$

$$E_{unit} = \frac{6i + 7j + 2k}{\sqrt{36+49+4}} = \frac{6i + 7j + 2k}{\sqrt{89}}$$

$$E_A = \frac{3i + 4j - 2k}{\sqrt{36+16+4}} = \frac{3i + 4j - 2k}{\sqrt{56}}$$

QD

$$E_B = \frac{1i + 2j + 1k}{\sqrt{1+4+1}} = \frac{1i + 2j + 1k}{\sqrt{6}}$$

QD

$$E_C = \frac{2i + 1j + 3k}{\sqrt{4+1+9}} = \frac{2i + 1j + 3k}{\sqrt{14}}$$

$$-16i + 10j + 11k$$

~~$\sqrt{-16t^2 + 2^2 + 1^2}$~~   
 ~~$\sqrt{25c}$~~

②

2  $r = x + y + zt$   
 $r = (8t^2) + (t^2 - 4t)j + (t - 1)k$

$\frac{dr}{dt} = -16t^2 + (2t - 4)j + k$

$\frac{d^2r}{dt^2} = 16i + 2j$

$\frac{d^2c}{dt^2} = \sqrt{16^2 + 2^2} = 16.12 //$

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

$$B = 8i - 2j + k$$

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

Find the vector triple product  $(A \times B) \times C$ .

$$(A \times B) \begin{vmatrix} i & j & k \\ 4 & 2 & -4 \\ 8 & -2 & 1 \end{vmatrix}$$

$$i \begin{vmatrix} 2 & 4 \\ -2 & 1 \end{vmatrix} - j \begin{vmatrix} 4 & -4 \\ 8 & 1 \end{vmatrix} + k \begin{vmatrix} 4 & 2 \\ 8 & -2 \end{vmatrix}$$

$$i(2 - 8) - j(4 - 32) + k(-8 - 16)$$

$$-6i - 36j - 24k$$

$$-6i - 36j - 24k$$

$$((A \times B) \times C) \begin{vmatrix} i & j & k \\ -6 & -36 & -24 \\ 1 & 4 & -3 \end{vmatrix}$$

$$i \begin{vmatrix} -36 & -24 \\ 4 & 3 \end{vmatrix} - j \begin{vmatrix} -6 & -24 \\ 1 & -3 \end{vmatrix} + k \begin{vmatrix} -6 & -36 \\ 1 & 4 \end{vmatrix}$$

$$i(-108 - (-96)) - j(18 - (-24)) + k(-24 - (-36))$$
$$-12i - 42j + 12k$$

$$(A \times B) \times C = -12i - 42j + 12k$$