Assignment w#08

Ch #07

Ex 7.1, 7.2, 7.3

MCQS **Q No 1**

1) 0 (A)

2) (A) Null vector

3) 1 (A)

4) A $(5\vec{v})$

Q NO 2

Solve the following short questions

i)

Solve:-

$u = ?$

$|u| = 2$

$v = i + j + k$

$u \parallel v$

$v = v$

$$\frac{u}{|u|} = \frac{v}{|v|}$$

(2) $u = |u| \frac{v}{|v|}$

$$u = (2) \frac{(-i+j+k)}{\sqrt{(2)^2+(-3)^2+(6)^2}}$$

$$= 2 \frac{(-i+j+k)}{\sqrt{4+9+36}}$$

$$u = 2 \frac{(-i+j+k)}{\sqrt{49}}$$

$$u = \frac{-2i+2j+2k}{\sqrt{49}}$$

$$u = -\frac{2}{7} i + \frac{2j}{7} + \frac{2k}{7}$$

(ii)

Solve:

$a = \cancel{3i}\ i - k \quad , \quad b = j + k$

Projection of a along $b = a \cdot b = a \cdot \frac{b}{|b|} = \frac{a \cdot b}{|b|}$

$$|b| = \sqrt{(1)^2+(1)^2} = \sqrt{1+1} = \sqrt{2}$$

$$= \frac{(i-k) \cdot (j+k)}{\sqrt{2}}$$

$$= \frac{0+0+1}{\sqrt{2}} = \frac{1}{\sqrt{2}}$$

Projection of b along $a = b \cdot a = b \cdot \frac{a}{|a|}$

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$$= \frac{b \cdot a}{|a|} = \frac{(j+k)\cdot(i-k)}{\sqrt{(1)^2+(-1)^2}} = \frac{0+0-1}{\sqrt{2}}$$

$$b \cdot a = -\frac{1}{\sqrt{2}}$$

iii)

Solve:-

$A = (1, -1)$, $B = (2, 0)$, $C = (-1, 3)$

$D = (-2, 2)$

$\vec{AB} = (2-1)i + (0+1)j = i + j$

$\vec{CD} = (-2+1)i + (2-3)j = -i - j$

Now $\vec{AB} + \vec{CD} = i + j - i - j$

$= 0i + 0j = 0$

QNO3

LONG QUESTION.

Solve:-

Let the triangle ABC such that D, E, F are the mid points of side $\vec{AB}$, $\vec{BC}$, $\vec{AC}$ respectively.

$\vec{OA} = a$, $\vec{OB} = b$, $\vec{OC} = c$ $\vec{OD} = \frac{a+b}{2}$

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$\vec{OE} = \frac{b+c}{2}$, $\vec{OF} = \frac{a+c}{2}$

$\vec{AB} = \vec{OB} - \vec{OA} = b - a$ $\quad$ $\vec{BC} = \vec{OC} - \vec{OB} = c - b$

$\vec{AC} = \vec{OC} - \vec{OA} = c - a$

Let $\vec{OD} \perp \vec{AB}$ be the right bisectors which meet at "O"

As $OD \perp AB$ so

$\vec{OD} \cdot \vec{AB} = 0$

$\left(\frac{a+b}{2}\right) \cdot (b-a) = 0$

$(b+a) \cdot (b-a) = 0$

$b^2 - a^2 = 0$ — (i)

As $OE \perp BC$ so

$OE \cdot BC = 0$

$\left(\frac{b+c}{2}\right) \cdot (c-b) = 0$

$c^2 - b^2 = 0$ — (ii)

Add (i) and (ii)

$b^2 - a^2 + c^2 - b^2 = 0$

$c^2 - a^2 = 0$

$(c+a) \cdot (c-a) = 0$

Devide both side by 2

$\left(\frac{c+a}{2}\right) \cdot (c-a) = \frac{0}{2}$

$\vec{OF} \cdot \vec{AC} = 0$

$\vec{OF} \perp \vec{AC}$

So $\vec{OF}$ is also a right biscetor of $\vec{AC}$

Thus all the right bisector are concurrent at "O".

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