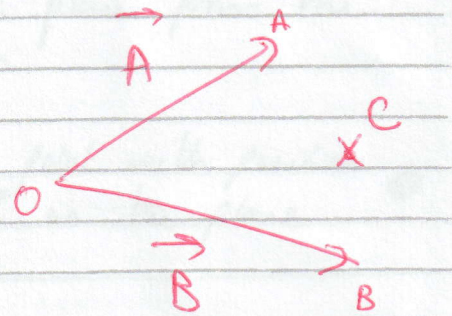
B4) a) $n = \overrightarrow{AB} \times \overrightarrow{AC}$ BC x AC

$$= \left(\begin{pmatrix}1\\1\\0\end{pmatrix} - \begin{pmatrix}3\\2\\1\end{pmatrix}\right) \times \left(\begin{pmatrix}1\\1\\1\end{pmatrix} - \begin{pmatrix}1\\2\\1\end{pmatrix}\right)$$

$$= \begin{pmatrix}-2\\-1\\-1\end{pmatrix} \times \begin{pmatrix}-2\\-1\\0\end{pmatrix}$$



$$= \begin{pmatrix}2\\1\\1\end{pmatrix} \times \begin{pmatrix}2\\1\\0\end{pmatrix}$$

$$= \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 2 & 1 & 1 \\ 2 & 1 & 0 \end{vmatrix}$$

$$= \begin{pmatrix}-1\\2\\0\end{pmatrix} \qquad \begin{pmatrix}-1\\1\\1\end{pmatrix}/\sqrt{3}$$

$$\hat{n} = \frac{1}{|n|} n = \frac{1}{\sqrt{1+4+0}} \begin{pmatrix}-1\\2\\0\end{pmatrix}$$

$$= \frac{1}{\sqrt{5}} \begin{pmatrix}-1\\2\\0\end{pmatrix}$$

b) $\left(\vec{r} - \begin{pmatrix}3\\2\\1\end{pmatrix}\right) \cdot \frac{1}{\sqrt{5}} \begin{pmatrix}-1\\2\\0\end{pmatrix} = 0$

$$\left[r - \begin{pmatrix}1\\1\\1\end{pmatrix}\right] \cdot \frac{1}{\sqrt{3}} \begin{pmatrix}-1\\1\\1\end{pmatrix} = 0$$