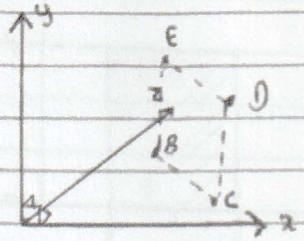
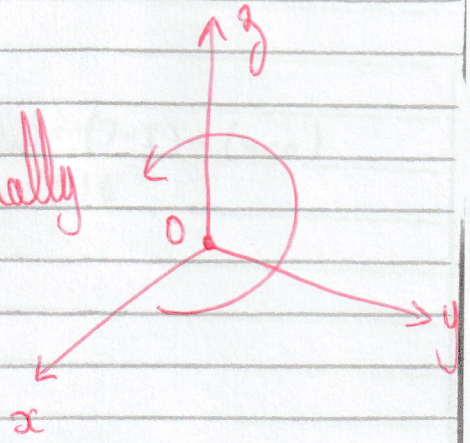
Maths Supervision Questions 2

E1 a) ~~$\vec{BC} \times \vec{BE}$~~



normally



$\vec{n} = \vec{BC} \times \vec{BE}$

$$= \left(\begin{pmatrix}5\\0\\3\end{pmatrix} - \begin{pmatrix}2\\0\\7\end{pmatrix}\right) \times \left(\begin{pmatrix}2\\4\\7\end{pmatrix} - \begin{pmatrix}2\\0\\7\end{pmatrix}\right)$$

$$= \begin{pmatrix}3\\0\\-4\end{pmatrix} \times \begin{pmatrix}0\\4\\0\end{pmatrix}$$

$$= \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 3 & 0 & -4 \\ 0 & 4 & 0 \end{vmatrix}$$

$$= \begin{pmatrix}-16\\0\\-12\end{pmatrix}$$ check

$|\vec{n}| = |\vec{BC}||\vec{BE}| \sin\frac{\pi}{2} = |\vec{BC}||\vec{BE}| = A$

$= \sqrt{16^2 + 12^2}$

$= \sqrt{400}$

$= 20$

$\therefore \hat{n} = \frac{1}{|\vec{n}|}\vec{n} = \frac{1}{20}\begin{pmatrix}-16\\0\\12\end{pmatrix} = \frac{1}{5}\begin{pmatrix}-4\\0\\3\end{pmatrix}$

b) $\vec{S} = A\hat{n} = |\vec{n}|\hat{n} = \vec{n} = $ [illegible] $\begin{pmatrix}-16\\0\\12\end{pmatrix}$

$= 20\hat{n}$