donc :

$$\vec{E_o} = \cos\alpha(\cancel{E_A} + \cancel{E_B} - \cancel{E_C} - \cancel{E_D})\vec{i} + \sin\alpha(-E_A + E_B + E_C - E_D)\vec{j}$$

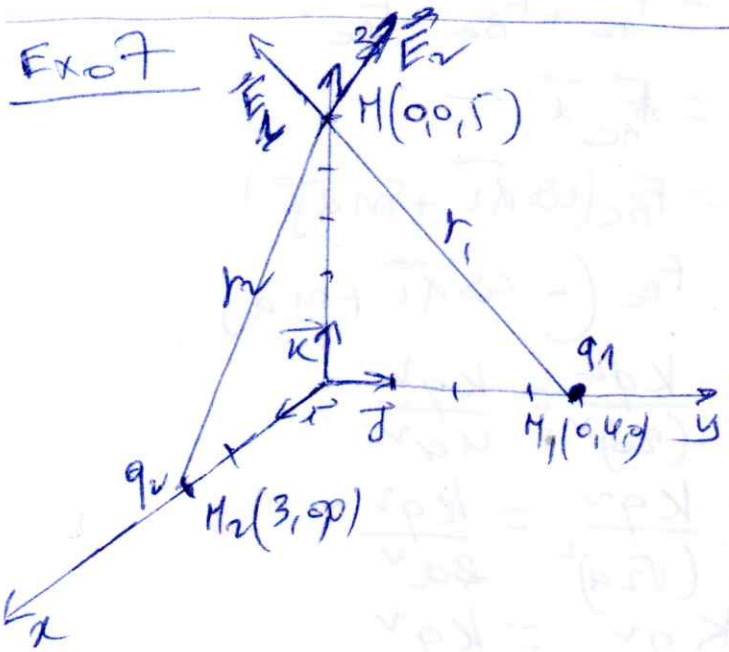
$$= \sin\alpha(-2E_A + 2E_B)\vec{j}$$

$$= \frac{1}{\sqrt{5}}\left(-\frac{2kq}{5a^2/4} + \frac{4kq}{5a^2/4}\right)\vec{j}$$

$$= \frac{1}{\sqrt{5}}\left(-\frac{8kq}{5a^2} + \frac{16kq}{5a^2}\right)\vec{j}$$

$$\vec{E_o} = \frac{8kq}{5\sqrt{5}a^2}\vec{j} \quad V/m, N/C$$

Exo7



Le champ électrique :

$$\vec{E_M} = \vec{E_1} + \vec{E_2}$$

$$\vec{E_1} = \frac{Kq_1}{r_1^2}\vec{U_1}$$

$$\vec{E_2} = \frac{Kq_2}{r_2^2}\vec{U_2}$$

$$U_1 = \frac{\overrightarrow{M_1M}}{\|\overrightarrow{M_1M}\|} \quad ; \quad U_2 = \frac{\overrightarrow{M_2M}}{\|\overrightarrow{M_2M}\|}$$

$$\overrightarrow{M_1M}\begin{pmatrix}0-0\\0-4\\5-0\end{pmatrix} = \begin{pmatrix}0\\-4\\5\end{pmatrix} \Rightarrow$$

$$\overrightarrow{M_1M} = -4\vec{j} + 5\vec{k}$$

$$\|\overrightarrow{M_1M}\| = \sqrt{41}$$

$$\overrightarrow{M_2M}\begin{pmatrix}0-3\\0-0\\5-0\end{pmatrix} = \begin{pmatrix}-3\\0\\5\end{pmatrix}$$

$$\overrightarrow{M_2M} = -3\vec{i} + 5\vec{k}$$

$$\|\overrightarrow{M_2M}\| = \sqrt{34}$$

$$\vec{E_1} = \frac{Kq_1}{\|\overrightarrow{M_1M}\|^2} \cdot \frac{\overrightarrow{M_1M}}{\|\overrightarrow{M_1M}\|}$$

$$= \frac{kq_1}{41}\left(\frac{-4\vec{j} + 5\vec{k}}{\sqrt{41}}\right)$$

$$\vec{E_1} = -48{,}02\vec{j} + 60{,}02\vec{k}$$

$$\vec{E_2} = \frac{Kq_2}{(\|\overrightarrow{M_2M}\|)^2} \cdot \frac{\overrightarrow{M_2M}}{\|\overrightarrow{M_2M}\|}$$

$$= \frac{kq_2}{34} \cdot \left(\frac{-3\vec{i} + 5\vec{k}}{\sqrt{34}}\right)$$

$$= -74{,}92\vec{i} + 124{,}06\vec{k}$$

$$\vec{E_M} = -74{,}92\vec{i} - 48{,}06\vec{j} + 184{,}88\vec{k}$$

$$\|\vec{E_M}\| = 205{,}18 \text{ V/m ou N/C}$$