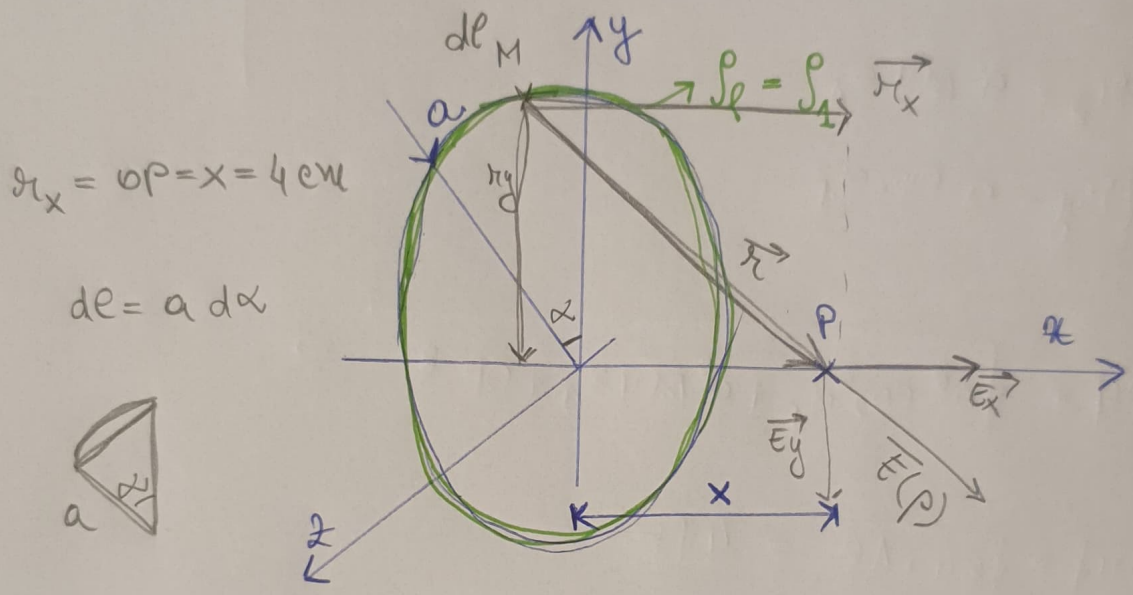
# Temă seminar 2

(2.) rază circulară : $x = 8\,cm$

$q$ : $\rho_1 = 4 \cdot 10^{-8}\, C/m$

$\varepsilon_0 \simeq \frac{1}{4\pi \cdot 9 \cdot 10^9}\, \frac{F}{m}$

$E(P) = ?$ , $x = 4\,cm$. (pe axa coordonatei)




$r_x = OP = x = 4\,cm$

$dl = a\, d\alpha$




$$\bar{E}(P) = \int_{\Gamma} \frac{\rho_l\, dl\, \bar{r}}{4\pi \varepsilon_0 r^3} = E_x \cdot \vec{i} + E_y \bar{j} + E_z \cdot \bar{k} \Bigg\} \Rightarrow$$

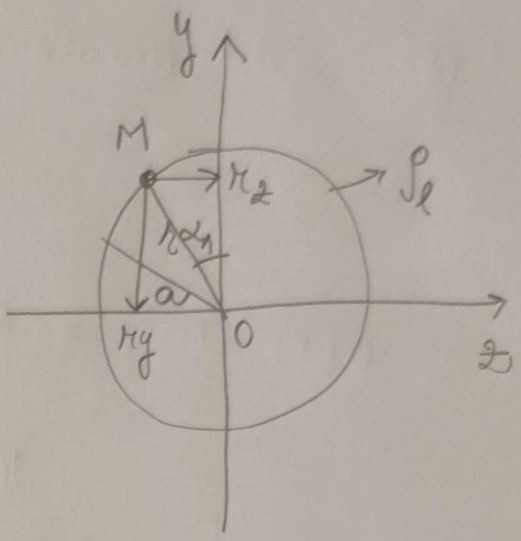
simetrie $\Rightarrow$ $E_y = E_z = 0$

$\Rightarrow \bar{E}(P) = E_x \cdot \bar{i}$.

Oy axă de simetrie

(curbă închisă) $\alpha \in [0, 2\pi]$

$$r = r_x \cdot \bar{i} + r_y \cdot \bar{j} + r_z \cdot \bar{k}$$




$$\begin{cases} r_z = R \sin\alpha_1 \\ r_y = r\cos\alpha_1 \\ r = a \end{cases}$$

$$\Rightarrow \begin{cases} r_z = a\sin\alpha_1 \\ r_y = a\cos\alpha_1 \end{cases}$$

$$r_M = \sqrt{a^2\cos^2\alpha_1 + a^2\sin\alpha_1 + OP^2} \Rightarrow$$

$$\Rightarrow |r| = \sqrt{64+16} = 4\sqrt{5}$$

$$d\ell = a\,d\alpha = 8\,d\alpha$$

$$\Rightarrow \bar{E}(P) = \frac{\rho_\ell \cdot x \cdot a}{2\varepsilon_0\left(\sqrt{a^2+x^2}\right)^3} \cdot \bar{i}$$