



UNIVERSIDAD DE SAN CARLOS DE GUATEMALA
FACULTAD DE INGENIERÍA
ESCUELA DE CIENCIAS
DEPARTAMENTO DE FÍSICA
FÍSICA 2
INGA. CLAUDIA CONTRERAS

TAREA		NOMBRES: <u>Leonel Antonio</u>		SECCIÓN: B+
HT	X	APELLIDOS: <u>González García</u>		
No. 3		CARNÉ: <u>201709088</u>	2S2023	

HT3

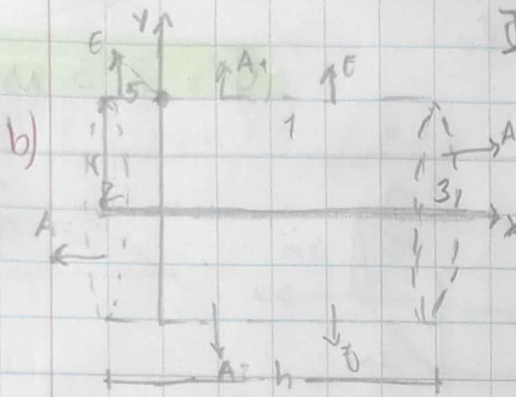
Problema 1:

a) $\lambda = 6.00 \text{ nC/m}$
 $r = 0.04 \text{ m}$

$$\Phi = \frac{2a}{\epsilon_0} = \frac{(6 \times 10^{-9})(2(0.04))}{8.8542 \times 10^{-12}}$$

$$\Phi = 54.21 \text{ Nm}^2/\text{C}$$

$$\Phi = 54.2 \text{ Nm}^2/\text{C}$$



$r = 0.05 \text{ m}$
 $\lambda = 6.00 \text{ nC/m}$

$$\oint \vec{E} \cdot d\vec{A}_1 \cos 0^\circ + \oint \vec{E} \cdot d\vec{A}_2 \cos 180^\circ + \oint \vec{E} \cdot d\vec{A}_3 \cos 90^\circ = \frac{q_{\text{enc}}}{\epsilon_0}$$

$$\oint \vec{E} \cdot d\vec{A} \cos 90^\circ = \frac{q_{\text{enc}}}{\epsilon_0}$$

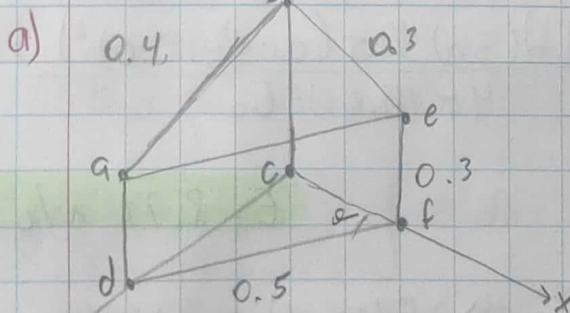
$$\oint \vec{E} \cdot d\vec{A} = \frac{q_{\text{enc}}}{\epsilon_0} \Rightarrow E(2\pi rh) = \frac{q_{\text{enc}}}{\epsilon_0}$$

$$E = \frac{q_{\text{enc}}}{2\pi rh\epsilon_0} = \frac{\lambda h}{2\pi h\epsilon_0} = \frac{\lambda}{2\pi\epsilon_0 r} = \frac{(6 \times 10^{-9})}{2\pi(0.05)\epsilon_0} = 2157 \text{ N/C}$$

$$E = 2.16 \text{ kN/C}$$

Problema

$$\vec{E} = 2.5 \times 10^3 \text{ N/C} \quad (+k)$$

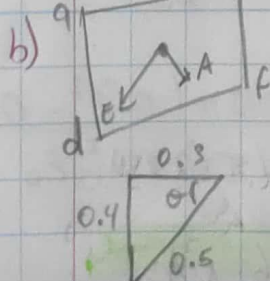


$$\Phi = EA \cos \theta$$

$$\Phi = E(0.3)^2 \cos 180^\circ$$

$$\Phi = -225 \text{ Nm}^2/\text{C}$$

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$$\Phi = EA \cos 90^\circ$$

$$\Phi = E(0.5)(0.3) \cos \theta$$

$$\Phi = E(0.15) \sin(36.87^\circ)$$

$$\Phi = 225 \text{ Nm}^2/\text{C}$$

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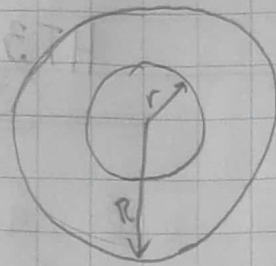
$$\theta = \cos^{-1}\left(\frac{0.3}{0.5}\right) = 53.13^\circ \Rightarrow 90 - 53.13 = 36.87$$

Problema 3.

$$r = 0.02 \text{ m}$$

$$\lambda = 4 \text{ nC/m}^2$$

$$R = 0.04$$

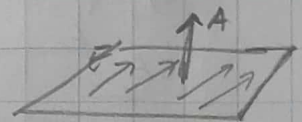
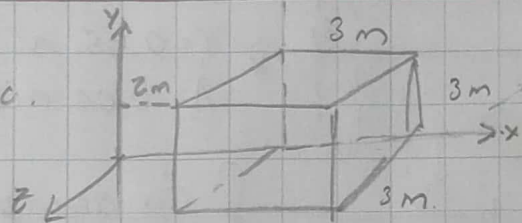


$$\Phi = \frac{q_{\text{enc}}}{\epsilon_0} = \frac{\lambda A}{\epsilon_0} = \frac{\lambda (4\pi (0.02)^2)}{\epsilon_0} = 2.27 \text{ Nm}^2/\text{C}$$

$$\Phi = 2.3 \text{ Nm}^2/\text{C}$$

Problema 4:

$$\vec{E} = (8x + 2y\hat{j}) \text{ N/C}$$



$$\Phi = EA$$

$$\Phi = 2(3)(3^2) = 54 \text{ Nm}^2/\text{C}$$

$$\Phi = E_x A_x + E_y A_y + E_z A_z$$

$$\Phi = 54 \frac{\text{Nm}^2}{\text{C}}$$

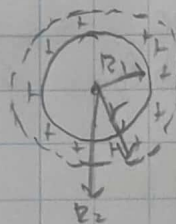
Problema 5:

a) $\rho = 5 \text{ nC/m}^3$

$$R_1 = 0.06 \text{ m}$$

$$R_2 = 0.1 \text{ m}$$

$$E = r = 0.08 \text{ m}$$



$$V = \frac{4}{3} \pi (r^3 - R_1^3)$$

$$\oint E dA = \frac{q_{\text{enc}}}{\epsilon_0} \Rightarrow E A = \frac{q_{\text{enc}}}{\epsilon_0}$$

$$E = \frac{\rho V}{A \epsilon_0} = \frac{\rho \frac{4}{3} \pi (r^3 - R_1^3)}{4 \pi r^2 \epsilon_0} = \frac{(5 \text{ n}) \frac{4}{3} \pi (0.08^3 - 0.06^3)}{4 \pi (0.08)^2 \epsilon_0}$$

$$E = 8.7058 \text{ N/C}$$

$$E = 8.71 \text{ N/C}$$

b) $E = r = 0.15$

$$\oint E dA = \frac{q_{\text{enc}}}{\epsilon_0} \Rightarrow E (4 \pi r^2) = \frac{\rho V}{\epsilon_0}$$



$$E = \frac{\rho \frac{4}{3} \pi (R_2^3 - R_1^3)}{4 \pi r^2 \epsilon_0} = \frac{(5 \text{ n}) \frac{4}{3} \pi (0.1^3 - 0.06^3)}{4 \pi (0.15)^2 \epsilon_0}$$

$$E = 6.5589 \text{ N/C}$$

$$E = 6.56 \text{ N/C}$$