UNIVERSIDAD DE SAN CARLOS DE GUATEMALA
FACULTAD DE INGENIERIA
ESCUELA DE CIENCIAS
DEPARTAMENTO DE FISICA

# TAREA No. 2

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Carné: __201709088_____ CAPÍTULO No.: __**22**___

Sección:__P__ NOMBRE DEL CAPITULO: **Ley de Gauss**

Profesor: ___BAYRON ARMANDO CUYAN__ Auxiliar: _ _José Balux_____

22.1, 22.3, 22.9, 22.10, 22.14, 22.17, 22.18, 22.21, 22.24, 22.25, 22.33, 22.41, 22.45, 22.53.

----------Puede iniciar su tarea a partir de aquí (Mínimo 8 problemas) ----------

# Capítulo 22 Ley de Gauss

## 22.1

$A = 0.250\ m^2$
$\theta = 60°$
$\vec{E} = 14\ N/C$

a) $\Phi_E = EA\cos\theta$
$\Phi_E = (14)(0.250)\cos 60°$
$\Phi_E = 1.75\ N\cdot m^2/C$

$\Phi_E = 1.75\ N\cdot m^2/C$ //

b) No depende de la forma de la hoja, solo del área.

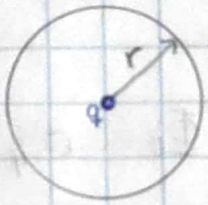
c) i) Máximo.
$\cos\theta = 1$
$\theta = \cos^{-1}(1)$
$\theta = 0$
$\theta = 0°$ //

ii) Mínimo.
$\cos\theta = 0$
$\theta = \cos^{-1}(0)$
$\theta = 90°$
$\theta = 90°$ //

## 22.3

$\vec{E} = 1.25 * 10^6\ N/C$
$r = 0.150\ m$

a)




$\Phi_E = E \cdot A$
$\Phi_E = E(4\pi r^2)$

$\Phi_E = (1.25 * 10^6)(4\pi(0.150)^2)$

$\Phi_E = 353429.17\ N\cdot m^2/C = 3.53 * 10^5\ N\cdot m^2/C$

$\Phi_E = 3.53 * 10^5\ N\cdot m^2/C$ //

b) $\Phi_E = \frac{q_{enc}}{\varepsilon_0} \rightarrow \varepsilon_0 \Phi_E = q_{enc}$

$q_{enc} = (8.85 * 10^{-12})(3.53 * 10^5) = 3.12 * 10^{-6}\ C$

$q_{enc} = 3.12 * 10^{-6}\ C$ //

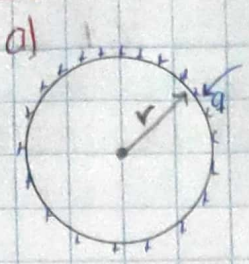
## 22.9

$d = 12.0\,cm$

$q = -49.0\,\mu C$

$r = 0.06\,m$

a)




$E = \frac{kq}{r^2}$

$E = \frac{k(0)}{r^2} = 0$

$E = 0$ //

b) $E = \frac{k|q|}{r^2} = \frac{9*10^9(49*10^{-6})}{(0.06)^2} = 1.22*10^8\ N/C$

$E = 1.22*10^8\ N/C$ //

c) $E = \frac{9*10^9(49*10^{-6})}{(0.06+0.05)^2} = 3.64*10^7\ N/C$

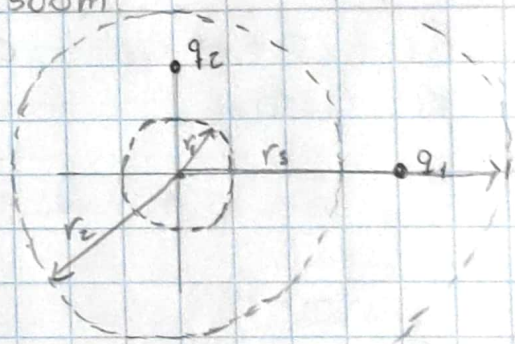
$E = 3.64*10^7\ N/C$ //

## 22.10

$q_1 = 4.00\,nC$ $\quad q_2 = -6.00\,nC$

$x = 2.00\,m$ $\quad y = 1.00\,m$

a) $r_1 = 0.500\,m$




$\Phi_E = \frac{q_{enc}^{\,0}}{\varepsilon_0} = 0$

$\Phi_E = 0$ //

b) $r_2 = 1.50\,m$

$\Phi_E = \frac{-6.00*10^{-9}}{8.85*10^{-12}} = -678\ N m^2/C$

$\Phi_E = -678\ N\cdot m^2/C$ //

c) $r_3 = 2.50\,m$

$\Phi_E = \frac{q_1+q_2}{\varepsilon_0} = \frac{(4n-6n)}{\varepsilon_0} = \frac{-2*10^{-9}}{8.85*10^{-12}} = -225.98\ N\cdot m^2/C$

$\Phi_E = -226\ N\cdot m^2/C$ //

## 22.14

$r = 0.450\ m$

$q_{esfera} = 0.250\ nC$

a) $h = 0.100\ m$

$$E = \frac{k\,q_{esf}}{r^2} = \frac{9\cdot10^9\,(0.250\cdot10^{-9})}{(0.450+0.100)^2}$$

$$E = 7.44\ N/C$$

$$E = 7.44\ N/C\ \uparrow$$

b) $r = 0.350\ m$

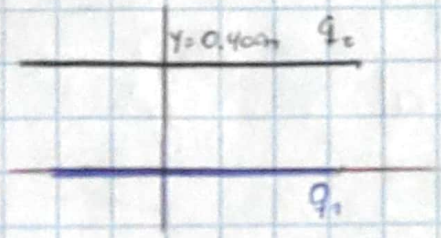
$$E = \frac{q_{esf}}{\varepsilon_0} = 0$$

$$E = 0\ \uparrow$$

## 22.17

$\lambda_1 = 4.80\ \mu C/m$

$\lambda_2 = -2.40\ \mu C/m$




$$E = \frac{2k\lambda}{r}$$

a) $y = 0.200\ m$

$$E_T = \frac{2k(\lambda_1+\lambda_2)}{r} = \frac{2(9\cdot10^9)}{0.200}(4.80+2.4) = 6.48\cdot10^5\ N/C$$

$$E_T = 6.48\cdot10^5\ N/C\ \uparrow$$

b) $y = 0.600\ m$

$$E_1 = \frac{2(9\cdot10^9)(4.80\cdot10^{-6})}{0.600} = 1.44\cdot10^5\ N/C$$

$$E_2 = \frac{2(9\cdot10^9)(2.40\cdot10^{-6})}{0.200} = 2.16\cdot10^5\ N/C$$

$$E_T = -1.44\cdot10^5 + 2.16\cdot10^5 = 7.2\cdot10^4\ N/C$$

$$E_T = 7.2\cdot10^4\ N/C\ \uparrow$$

## 22.18

$E = 840\ N/C$
$r = 0.400\ m$
$\ell = 0.02\ m$

$$E = \frac{2k\lambda}{r} \qquad \lambda = \frac{q}{\ell}$$

$$\frac{rE}{2k} = \lambda \Rightarrow \lambda = \frac{(0.400)(840)}{2(9\times10^9)}$$

$$\lambda = 1.86\times10^{-8}$$

$$\ell\lambda = q \Rightarrow q = (0.02)(1.86\times10^{-8})$$
$$q = 3.72\times10^{-10}$$

$$q = 3.72\times10^{-10}\ C.$$

## 22.21

$r = 0.145\ m$
$R = 0.355\ m$
$E = 1750\ N/C$

a) $q_{enc} = \rho\, Vol$

$$EA = \frac{q}{\varepsilon_0}$$

$$\varepsilon_0 EA = q_{enc}$$

$$q_{enc} = (8.85\times10^{-12})(1750)(4\pi(0.355+0.145)^2) = 4.86\times10^{-8}\ C$$

$$\rho = \frac{4.86\times10^{-8}}{\frac{4}{3}\pi(0.35)^3} = 2.60\times10^{-7}\ C/m^3$$

$$\rho = 2.60\times10^{-7}\ C/m^3$$

b) $r_{ex} = 0.200\ m$

$$\oint \vec{E}\cdot d\vec{A} = \frac{q_{enc}}{\varepsilon_0}$$

$$q_{enc} = (2.60\times10^{-7})\left(\frac{4}{3}\pi(0.200)^3\right)$$

$$q_{enc} = 8.71\times10^{-9}$$

$$E(4\pi r^2) = \frac{q_{enc}}{\varepsilon_0}$$

$$E = \frac{q_{enc}}{4\pi r^2\varepsilon_0} = k\frac{q_{enc}}{r^2} = \frac{(9\times10^9)(8.71\times10^{-9})}{(0.200)^2} = 1959.75\ N/C$$

$$E = 1.96\times10^3\ N/C$$