Universidad de San Carlos de Guatemala
Facultad de Ingeniería, Departamento de Física
Examen de Reposición Física 2, Primer Semestre 2025

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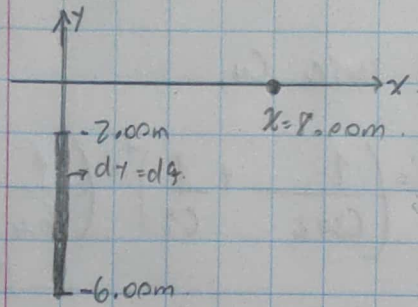
## Problema 1:

$q = 24\,nC$ $\quad V = \int \frac{k\,dq}{r}$ $\quad r = y$




$\lambda = \frac{q}{\ell}$ $\quad \lambda = \frac{24\,nC}{4} = 6\,nC/m$

$q = \ell\,\lambda$

$dq = dy\,\lambda$

a)

$$V = \int_{-6}^{-2} \frac{k\lambda\,dy}{y} = k\lambda \int_{-6}^{-2} \frac{dy}{y} = k\lambda \ln y \Big|_{-6}^{-2}$$

$$V = (9\times10^{-9})(6\times10^{-9})\left[\ln(-2) - \ln(-6)\right] = 54\left[\ln\left(\frac{-2}{-6}\right)\right]$$

$$V = 54 \ln\left(\frac{2}{6}\right) = -59.32\ V$$

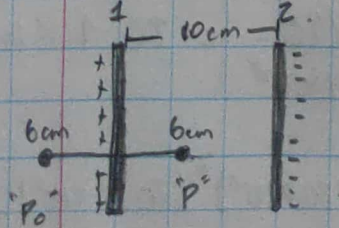
$V = -59.3\ V$

b) $E(8,0) = -\nabla V = -\ln y$

$E_{x=8} = 0.$

$$E(x) = \frac{\partial V}{\partial x} = 0$$

## Problema 3.




$\sigma_1 = 6.00\,\mu C/m^2$ $\quad E_1 = \frac{\sigma_1}{2\varepsilon_0} = \frac{6\mu}{2\varepsilon_0}$

$\sigma_2 = -10.0\,\mu C/m^2$

$E_1 = 0.338\times10^6\ N/C$

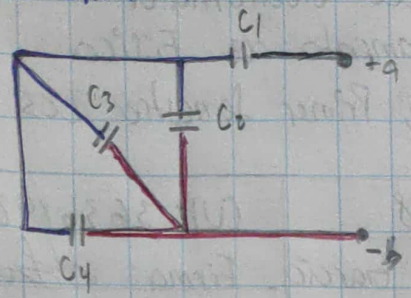
$$E_2 = \frac{-10\,\mu}{2\varepsilon_0} = -0.565\times10^6\ N/C$$

$E_1 = 0.338\ KN/C$

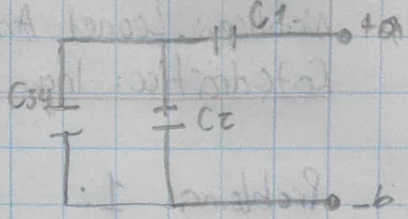
$E_2 = -0.565\ KN/C$

Escaneado con CamScanner

Problema 4:

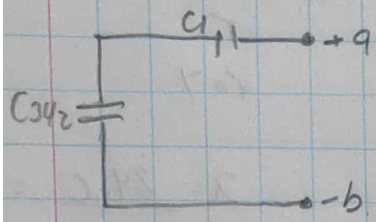



$C_1 = 10\,\mu F$ (C3 || C4)
$C_2 = 1\,\mu F$
$C_3 = 3\,\mu F$ $C_{34} = 3\mu + 3\mu$
$C_4 = 3\,\mu F$ $C_{34} = 5\,\mu F$.




$C_{34}$ || $C_2$

$C_{342} = 5\mu + 1\mu = 6\,\mu F$




$C_{342}$ serie $C_1$.

$$C_{eq} = \left(\frac{1}{C_{342}} + \frac{1}{C_1}\right)^{-1} = \left(\frac{1}{6\mu} + \frac{1}{10\mu}\right)^{-1}$$

Como $C_3$ || $C_4$.
$\Delta V_3 = \Delta V_4 = \Delta V_{34} = 5V$.

$C_{eq} = 3.75\,\mu F$.

Como $C_{34}$ || $C_2$
$\Delta V_{34} = \Delta V_2 = 5V$.

$C_{34} = \frac{Q}{V} \Rightarrow V_{34} C_{34} = Q_{34}$
$Q_{34} = (5)(5\mu)$
$Q_{34} = 2.5 * 10^{-5}\,C$

Como $C_{34}$ en serie con $C_1$
$Q_{34} = Q_1 = 2.5 * 10^{-5}\,C$. $\Rightarrow V_1 = \frac{Q_1}{C_1} = \frac{2.5 * 10^{-5}}{10\mu} =$

$V_{eq} = 2.5 + 5 + 5 + 5 = 17.5V$. $V_1 = 2.5\,V$.

$$U = \frac{1}{2} C_{eq} V_{eq}^2 = \frac{1}{2}(3.75\mu)(17.5)^2 = 574 * 10^{-6}\,J$$

$U = 574\,\mu J$
$C_{eq} = 3.75\,\mu F$.

Problema 6:
$r = 0.420\,mm$
$E = 0.490\,V/m$
$\rho = 2.44 * 10^{-8}\,\Omega \cdot m$

a) $J = \frac{E}{\rho} = \frac{0.490}{2.44 * 10^{-8}} = 20.1\,KA/m^2$

$I = AJ = \pi (0.420 * 10^{-3})^2 (20.1 * 10^6)$
$I = 11.14\,A$.

$I = 11.1\,A$.

b) $l = 6.40\,m$
$R = \frac{\rho l}{A} = \frac{2.44 * 10^{-8}(6.40)}{\pi (0.420 * 10^{-3})^2} = 0.2817\,\Omega$

$R = 0.282\,\Omega$.

Escaneado con CamScanner