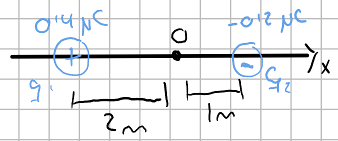
2.9 ✗



a.) ¿en qué puntos $V = 0$?

$$V = k\frac{q}{r} \Rightarrow k\frac{q_1}{r_1} + k\frac{q_2}{r_2} = 0$$

$|1-x|$ $\quad$ $|2+x|$ $\quad$ $\rightarrow 2|x-1| = |x+2|$ $\quad$ $\boxed{\begin{cases} x=0 \\ x=4 \end{cases}}$

$(q_1 = -2q_2)$

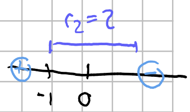
$$\Rightarrow 0 = kq_2\left(\frac{1}{r_1} - \frac{2}{r_2}\right)$$

$$\Rightarrow \frac{1}{r_1} - \frac{2}{r_2} = 0 \Rightarrow \frac{1}{r_1} = \frac{2}{r_2}$$

$$\Rightarrow r_2 = 2r_1$$ (será 0 en el punto en el que r_2 sea el doble que r_1)

$$\rightarrow \begin{cases} r_2 = 2r_1 \\ r_2 + r_1 = 3 \end{cases} \Rightarrow 3r_1 = 3 \Rightarrow \boxed{\begin{matrix} r_1 = 1 \\ r_2 = 2 \end{matrix}}$$

$3 - r_1 = r_2$



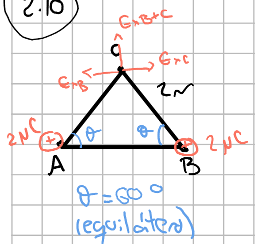
✗ $\boxed{\text{Será } 0 \text{ en } x = -1}$ (?) (y en $-\infty, \infty$) ← matemáticamente

b.) $$\vec{E} = k\frac{q}{r^2}\vec{u} \Rightarrow \vec{E}_{(0)} = k\frac{q_1}{r_1^2}\vec{u}_x + k\frac{-q_2}{r_2^2}(-\vec{u}_x) = k\vec{u}_x\left(\frac{q_1}{r_1^2} + \frac{q_2}{r_2^2}\right) =$$

$$= 9\cdot10^{+9}\,\vec{u}_x\,(0'1 + 0'2)\,10^{-6} = \boxed{2'7\cdot10^3\,\vec{u}_x\ N/C}$$ ✓

$(q = 0'4\,\mu C)$ $$\vec{F}_{(0)} = \left(k\frac{q\,q_1}{r_1^2} + k\frac{q\,q_2}{r_2^2}\right)\vec{u}_x = kq\vec{u}_x\left(\frac{q_1}{r_1^2} + \frac{q_2}{r_2^2}\right) = \vec{E}q = \boxed{1'08\cdot10^3\,\vec{u}_x\ N}$$ ✓

2.10



$\theta = 60°$ (equilátero)

a.) Las componentes x se cancelan, sólo hay y.

$$\vec{E}_{(C)} = 2k\frac{q}{r^2}\operatorname{sen}\theta\,\vec{j} = 2\cdot9\cdot10^9\,\frac{2}{4}\,10^{-6}\operatorname{sen}60°\,\vec{j} = \boxed{7'79\cdot10^3\,\vec{j}\ N/C}$$ ✓

$(q_B = q_C)$

$$V = Er = \boxed{1'8\cdot10^4\ V}$$ ✓

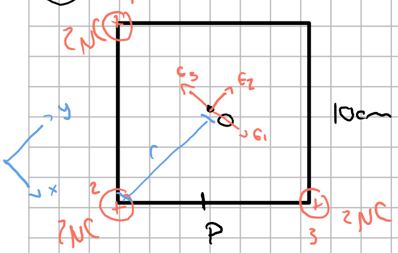
b.) Como se cancelan: $\boxed{V_T = 0}$ ✓

Las componentes y se cancelan.

$$\vec{E} = 2k\frac{q}{r^2}\operatorname{sen}\theta\,\vec{i} = \boxed{4493\,\vec{i}\ N/C}$$ ✓

(q iguales)

2.11



a) En el eje x se cancelan

$\vec{E}_{(0)} = K\frac{q}{r^2}\vec{j} = 9\cdot10^9\frac{2\cdot10^{-6}}{7'07\cdot10^{-2}}\vec{j} = \boxed{2'55\cdot10^5\ N/C}$

¿en sol. pone 10^6?

b) $V_p = K\frac{q}{r} + K\frac{q}{r} = 2K\frac{q}{r} = 2\cdot9\cdot10^9\frac{2\cdot10^{-6}}{5\cdot10^{-2}} = \boxed{7'2\cdot10^5}$ ✓

$r = \sqrt{5^2+5^2} = 7'07\,cm = 7'07\cdot10^{-2}\,m$

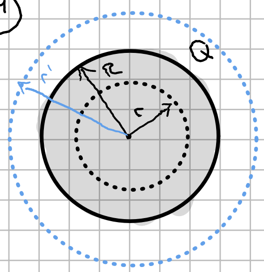
2.12

$E = \frac{2K\lambda}{d} = \frac{2K\lambda}{\sqrt{2}} = \frac{18\cdot10^9\cdot3\cdot10^{-9}}{1'41} = \boxed{38'18\ N/C}$

$d = \sqrt{2}$

2.13 (¿?)

2.14



Si $r > R$:

$\vec{E} = \frac{KQ}{r^2}\vec{u}$ $V = \frac{KQ}{r}$

Si $r < R$:

$\vec{E} = \frac{KQr}{R^3}\vec{u}$ $V = \frac{3}{2}\frac{KQ}{R} - \frac{KQr^2}{2R^3}$

2.15

$\int \rho(r)\,dr = \int e^{-2r/a} \xrightarrow[-\frac{2}{a}=c]{} \rho_0\int e^{cr} = \rho_0\frac{e^{cr}}{c} = \rho_0\frac{a e^{-2/a}}{-2}$

$\Rightarrow \rho_0\frac{a}{-2e^{2r/a}}\Big|_0^\infty = 0 + \rho_0\frac{a}{-2} = \rho_0\frac{5'29}{-2}$?

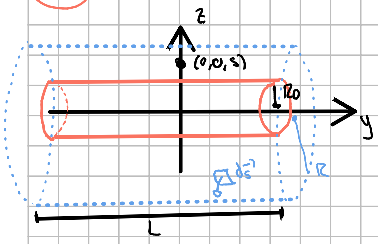
2.17

$m_p = 1'67 \cdot 10^{-27}$ Kg

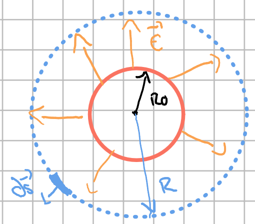
$e = 1'6 \cdot 10^{-19}$ C

$\frac{e}{m} = \boxed{9'6 \cdot 10^{7}}$

2.13



$R_0 = 2\mu m$



$Q_{encerr.} = \varepsilon_0 \Phi = \varepsilon_0 \oiint \vec{E}\,\vec{ds} = \varepsilon_0 E \oint \vec{ds} = \underbrace{\varepsilon_0 E\, L 2\pi R}$ carga que tiene el cilindro "imaginario" azul

La igualo a la del cilindro real: $\rightarrow$ $E L 2\pi R = \sigma L 2\pi R_0 \Rightarrow \boxed{\vec{E} = \frac{R_0}{R} \frac{\sigma}{\varepsilon_0} \vec{r}}$

$\Rightarrow \vec{E} = \frac{2}{5} \frac{3\,\mu C/m^2}{\varepsilon_0} = \boxed{135'5 \cdot 10^{3}\ N/C}$