UNIVERSIDAD DE SAN CARLOS DE GUATEMALA
FACULTAD DE INGENIERÍA
ESCUELA DE CIENCIAS
DEPARTAMENTO DE FÍSICA
ING. OSCAR TECUN

Física 2 P	Nota:
Junio 2022	
AUX. ANDREA GARCIA	

TAREA ☐
HOJA DE TRABAJO ☒
EXAMEN CORTO ☐

No. 2

CARNÉ:	202100023	FECHA:	8-06-2022
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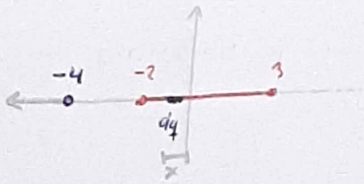
problema 1

#1

$\lambda = 4n\ C/m$



$E = k\int \frac{dq}{r^2}\hat{r}$

$r = -4-x$

$\frac{dq}{dx} = \lambda \rightarrow dq = \lambda dx$

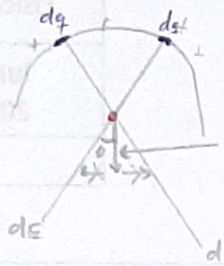
$E = k\lambda\int \frac{dx}{(-4-x)^2}(-\hat{\imath}) = (9\times10^9)(4\times10^{-9})\int_{-2}^{3}\frac{dx}{(-4-x)^2}(-\hat{\imath})$

$E = 12.857(-\hat{\imath}) = -13\hat{\imath}\ N/C$

$\vec{E} = -13[\hat{\imath}]\ \frac{N}{C}$

problema 2

#2



$2dEx = 2\cos\theta\, dE = 2\cos\theta \cdot \frac{k\,dq}{r^2}$

$l = 2m = S$

$\lambda = 3n\ C/m$

$r = cnst.$

$\frac{dq}{ds} = \lambda$

$E = k\int \frac{dq}{r^2}(-\hat{r})$

$dq = \lambda\, ds$

$ds = r\,d\theta$

$dq = \lambda r\, d\theta$

$E = k\int \frac{\lambda r\, d\theta}{r^2} \cdot 2\cos\theta$

$S = r\theta$

$r = \frac{S}{\theta} = \frac{2}{\pi}$

$E = \frac{2k\lambda}{r}\int_0^{\pi/2} \cos\theta\, d\theta$

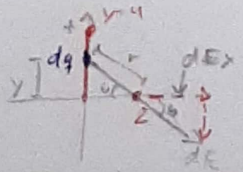
$|E| = \frac{2(9\times10^9)(3\times10^{-9})}{(2/\pi)}\int_0^{\pi/2}\cos\theta\, d\theta = 27\pi = 84.8 = 85\ N/C$

$\boxed{|E| = 85\ \frac{N}{C}}$

problema 3

#3

$q = 12n\,C$



$r = \sqrt{2^2 + y^2} = \sqrt{4 + y^2}$

$E_x = k\int \frac{dq}{r^2}\hat{i}$

$\frac{dq}{dy} = \lambda$

$dq = \lambda\, dy$

$E_x = k\int \frac{\lambda\, dy}{r^2}\cdot\cos\theta\ \hat{i}$

$\lambda = \frac{q}{l} = \frac{12\times10^{-9}}{4} = 3\times10^{-9}$

$dEx = dE\cos\theta = \frac{k\,dq}{r^2}\cos\theta$

$$\cos\theta = \frac{2}{r} = \frac{2}{(\sqrt{4+y^2})}$$

$$E_x = k\int \frac{\lambda\, dy}{r^2}\cdot\frac{2}{r}\uparrow = k\int_0^4 \frac{(3\times10^{-9})(2)}{(\sqrt{4+y^2})^3}\,dy\ (\uparrow)$$

$$= (9\times10^9)\int_0^4 \frac{(3\times10^{-9})(2)}{(4+y^2)^{3/2}}\,dy = \int_0^4 \frac{54\,dy}{(4+y^2)^{3/2}}$$

$$\boxed{E_x = \int_0^4 \frac{54\,dy}{(4+y^2)^{3/2}}}$$

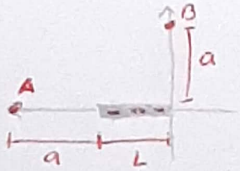
problema 4

#4

$L = 10\,cm = 0.1\,m$

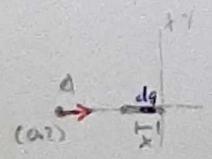
$q = -125\,\mu C$

$a = 10\,cm$



a) $\lambda = \frac{q}{l} = \frac{-125\times10^{-6}}{0.1} = -1.25\times10^{-3}\ C/m$

b) E_A



$$E = k\int \frac{dq}{r^2}\hat{r} =$$

$$\lambda = \frac{dq}{dx}$$

$$E = k\int \frac{\lambda\,dx}{r^2}\uparrow = (9\times10^9)(1.25\times10^{-3})\int_{-0.1}^{0} \frac{dx}{(-0.2-x)^2}\,\hat{i}$$

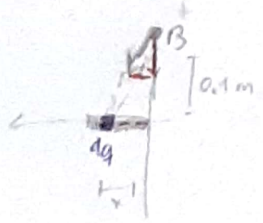
$dq = \lambda dx$

$r = (-0.2-x)$

$= 56250000\ N/C$

$= 56250\ kN/C$

c)



$$E_y = k\int \frac{dq}{r^2}(-\hat{\imath})$$

$$r = \sqrt{0.1^2 + x^2}$$

$$E_y = k\int \frac{\lambda\, dx}{r^2}\cos\theta$$

$$\frac{dq}{dx} = \lambda$$

$$\cos\theta = \frac{0.1}{r} = \frac{0.1}{\sqrt{0.1^2 + x^2}}$$

$$dq = \lambda dx$$

$$dE_y = dE\cos\theta$$

$$E_y = k\int \frac{\lambda}{r^2}\cdot\frac{0.1}{r}\,dx$$

$$E_y = (9\times10^9)\int_{-0.1}^{0} \frac{(1.25\times10^{-3})(0.1)}{(0.01+x^2)^{3/2}}\,dx\,(-\hat{\imath})$$

$$E_y = \int_{-0.1}^{0} \frac{1.125\times10^6}{(0.01+x^2)^{3/2}}\,dx\,[-\hat{\imath}]$$

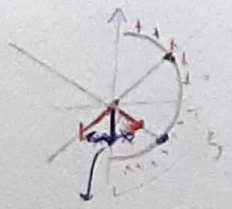
a) $\lambda = -1.25\times10^{-3}$ C/m

b) $E = 56250\,k$ N/C

c) $E_y = \int_{-0.1}^{0} \frac{1.125\times10^6}{(0.01+x^2)^{3/2}}\,dx$

problema 5

#5



$$2dE_y = 2dE\cos\theta$$

$$E = k\int \frac{dq}{r^2}[-\hat{\imath}]$$

$$E = 2k\int \frac{\lambda\, r\, d\theta}{r^2}\cos\theta\,(-\hat{\imath})$$

$$= \frac{2k\lambda}{r}\int_0^{\pi/2}\cos\theta\,(-\hat{\imath})$$

$$= \frac{2k\lambda}{r}(-\hat{\imath})$$

$$= \frac{2k\,2Q}{2R\pi}(-\hat{\imath}) = \frac{4kQ}{R^2\pi}(-\hat{\imath})$$

$$\frac{dq}{ds} = \lambda$$

$$dq = \lambda ds = \lambda\, d\theta\, r$$

$$ds = d\theta\cdot r$$

$$\lambda = \frac{q}{\ell} = \frac{q}{R\theta} = \frac{Q}{\frac{R\pi}{2}} = \frac{2Q}{R\pi}$$

$$\theta = \pi/2$$

$$\vec{E} = \frac{4kQ}{R^2\pi}(-\hat{\imath})$$