22.1

A = 0.250 m²   a) $\Phi_E = EA\cos\theta$.

$\theta = 60°$ $\Phi_E = (14)(0.250)\cos 60°$

$\vec{E} = 14 \, N/C$ $\Phi_E = 1.75 \, N\cdot m^2/C$.

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

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

c) i) Máxima.   ii) Mínimo.

$\cos\theta = 1$ $\cos\theta = 0$.

$\theta = \cos^{-1}(1)$ $\theta = \cos^{-1}(0)$

$\theta = 0$ $\theta = 90°$

$\theta = 0°$ $\theta = 90°$
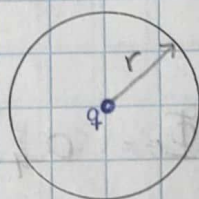
$\vec{E} = 1.25 \times 10^6 \, N/C$ a)

$r = 0.150 \, m$.

$\Phi_E = E\cdot A$

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

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

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

$$\Phi_E = 3.53 \times 10^5 \, N\cdot m^2/C$$
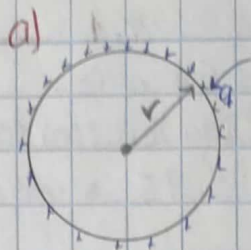
b) $\Phi_E = \dfrac{q_{enc}}{\varepsilon_0} \Rightarrow \varepsilon_0 \Phi_E = q_{enc}$.

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

$$q_{enc} = 3.12 \times 10^{-6} \, C$$

$d = 12.0$ cm

$q = -49.0 \, \mu C$

a)

$r = 0.06$ m

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

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

$$E = 0$$

b) $E = \dfrac{k|q|}{r^2} = \dfrac{9 \times 10^9 (49 \times 10^{-6})}{(0.06)^2} = 1.22 \times 10^8 \, N/c$

$$E = 1.22 \times 10^8 \, N/c$$

c) $E = \dfrac{9 \times 10^9 (49 \times 10^{-6})}{(0.06+0.05)^2} = 3.64 \times 10^7 \, N/c$

$$E = 3.64 \times 10^7 \, N/c$$

$q_1 = 4.00$ nC $q_2 = -6.00$ nC   a) $r_1 = 0.500$ m

$x = 2.00$ m $y = 1.00$ m

$\Phi_E = \dfrac{q_{enc}}{\varepsilon_0} = 0.$

$$\Phi_E = 0$$
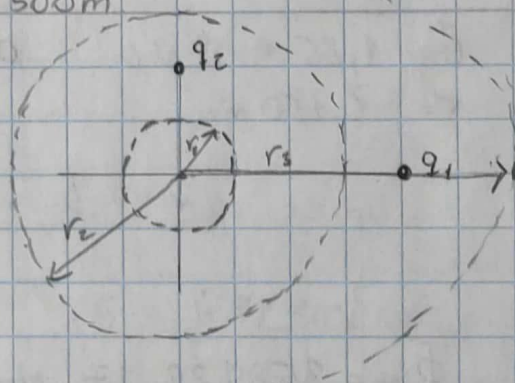
b) $r = 1.50$ m

$\Phi_E = \dfrac{-6.00 \times 10^{-9}}{8.85 \times 10^{-12}} = -678 \, Nm^2/c$

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

c) $r_3 = 2.50$ m

$\Phi_E = \dfrac{q_1 + q_2}{\varepsilon_0} = \dfrac{(4n - 6n)}{\varepsilon_0} = \dfrac{-2 \times 10^{-9}}{8.85 \times 10^{-12}} = -225.98 \, N \cdot m^2/c$

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

22.14.

r = 0.450 m
q_{neta} = 0.250 nC.

a) r_1 = 0.100 m

$$E = k \frac{q_{one}}{r^2} = \frac{9*10^9 (0.250*10^{-9})}{(0.450 + 0.100)^2}$$

$$E = 7.44 \ N/c.$$

$$\underline{E = 7.44 \ N/c}_{\text{\/}}$$

b) r = 0.350 m.

$$E = \frac{q_{enc}^0}{\varepsilon_0} = 0.$$

$$\underline{E = 0}_{\text{\/}}$$

22.17.

λ_1 = 4.80 uC/m
λ_2 = -2.40 uC/m

Y = 0.400m $\quad q_2$

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

q_1

a) Y = 0.200 m.

$$E_T = \frac{2k(\lambda_1 + \lambda_2)}{r} = \frac{2(9*10^9)}{0.200} (4.80 + 2.4) = 6.48 * 10^5 \ N/c$$
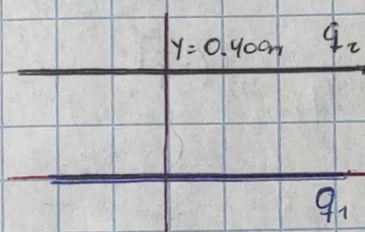
$$\underline{E_1 = 6.48 *10^5 \ N/c}_{\text{\/}}$$

b) Y = 0.600m

$$E_1 = \frac{2(9*10^9)(4.80 *10^{-6})}{0.600} = 1.44 *10^5 \ N/c$$

$$E_2 = \frac{2(9*10^9)(2.40 *10^{-6})}{0.200} = 2.16 *10^5 \ N/c.$$

$$E_T = -1.44*10^5 + 2.16 * 10^5 = 7.2*10^4 \ N/c.$$

$$\underline{E_T = 7.2 *10^4 \ N/c}_{\text{\/}}$$