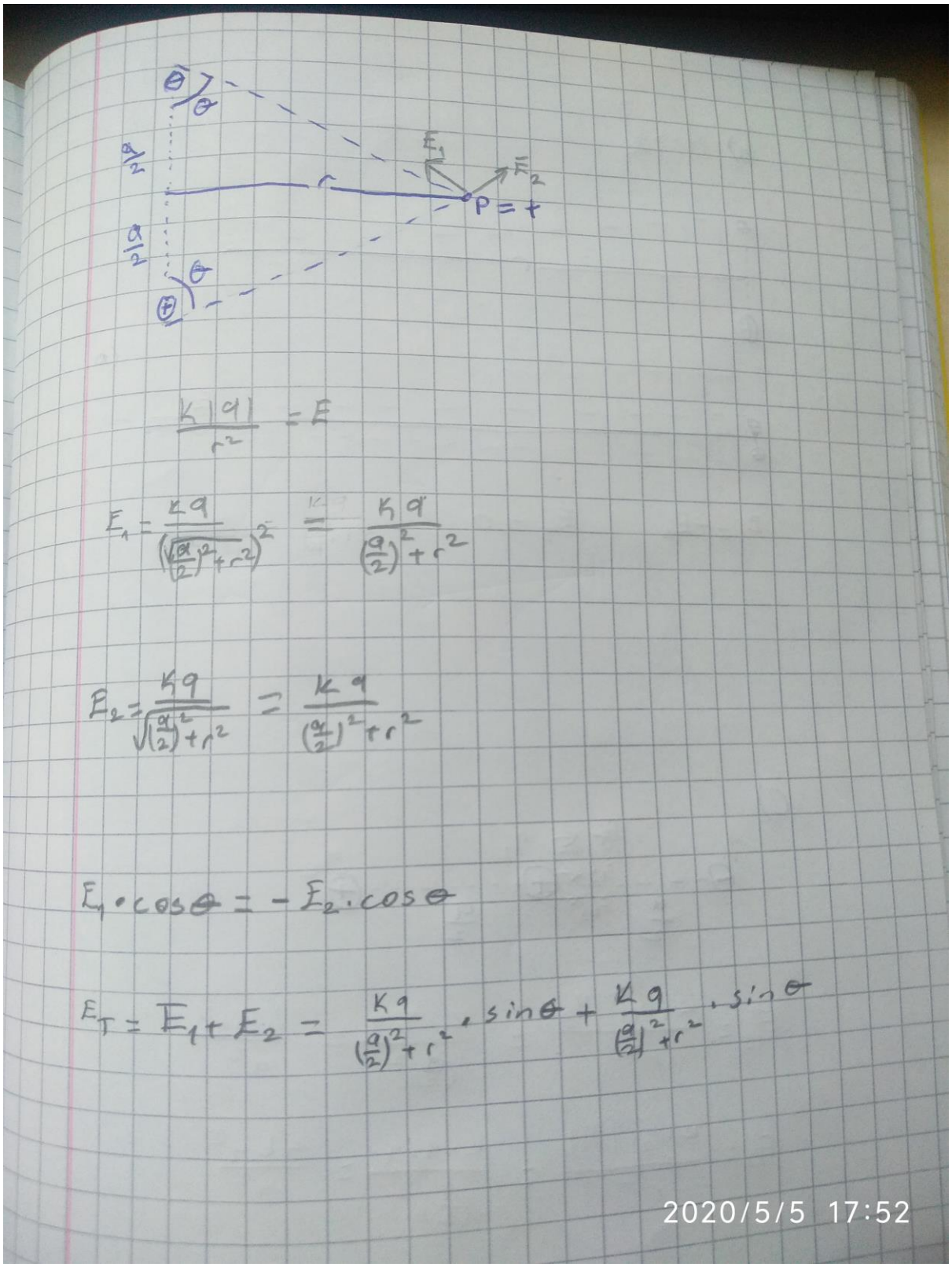
Soru 1:



$$\frac{K|q|}{r^2} = E$$

$$E_1 = \frac{Kq}{\left(\sqrt{\left(\frac{a}{2}\right)^2 + r^2}\right)^2} = \frac{Kq}{\left(\frac{a}{2}\right)^2 + r^2}$$

$$E_2 = \frac{Kq}{\sqrt{\left(\frac{a}{2}\right)^2 + r^2}} = \frac{Kq}{\left(\frac{a}{2}\right)^2 + r^2}$$

$$E_1 \cdot \cos\theta = -E_2 \cdot \cos\theta$$

$$E_T = E_1 + E_2 = \frac{Kq}{\left(\frac{a}{2}\right)^2 + r^2} \cdot \sin\theta + \frac{Kq}{\left(\frac{a}{2}\right)^2 + r^2} \cdot \sin\theta$$

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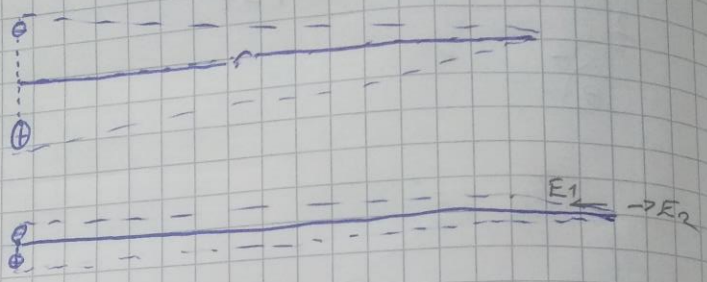
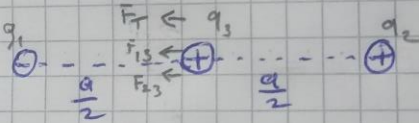
b) $r >> a$



$E_1 = -E_2 \qquad F_T = 0$

c)



$$F_{13} = \frac{k|q_1||q_3|}{r^2} = \frac{k \cdot q \cdot q}{\left(\frac{a}{2}\right)^2} = \frac{4kq^2}{a^2}$$

$$F_{23} = \frac{k|q_2||q_3|}{r^2} = \frac{k \cdot q \cdot q}{\left(\frac{a}{2}\right)^2} = \frac{4kq^2}{a^2}$$

$$F_T = F_{13} + F_{23} = \frac{4kq^2}{a^2} + \frac{4kq^2}{a^2}$$

$$F_T = \frac{8kq^2}{a^2}$$

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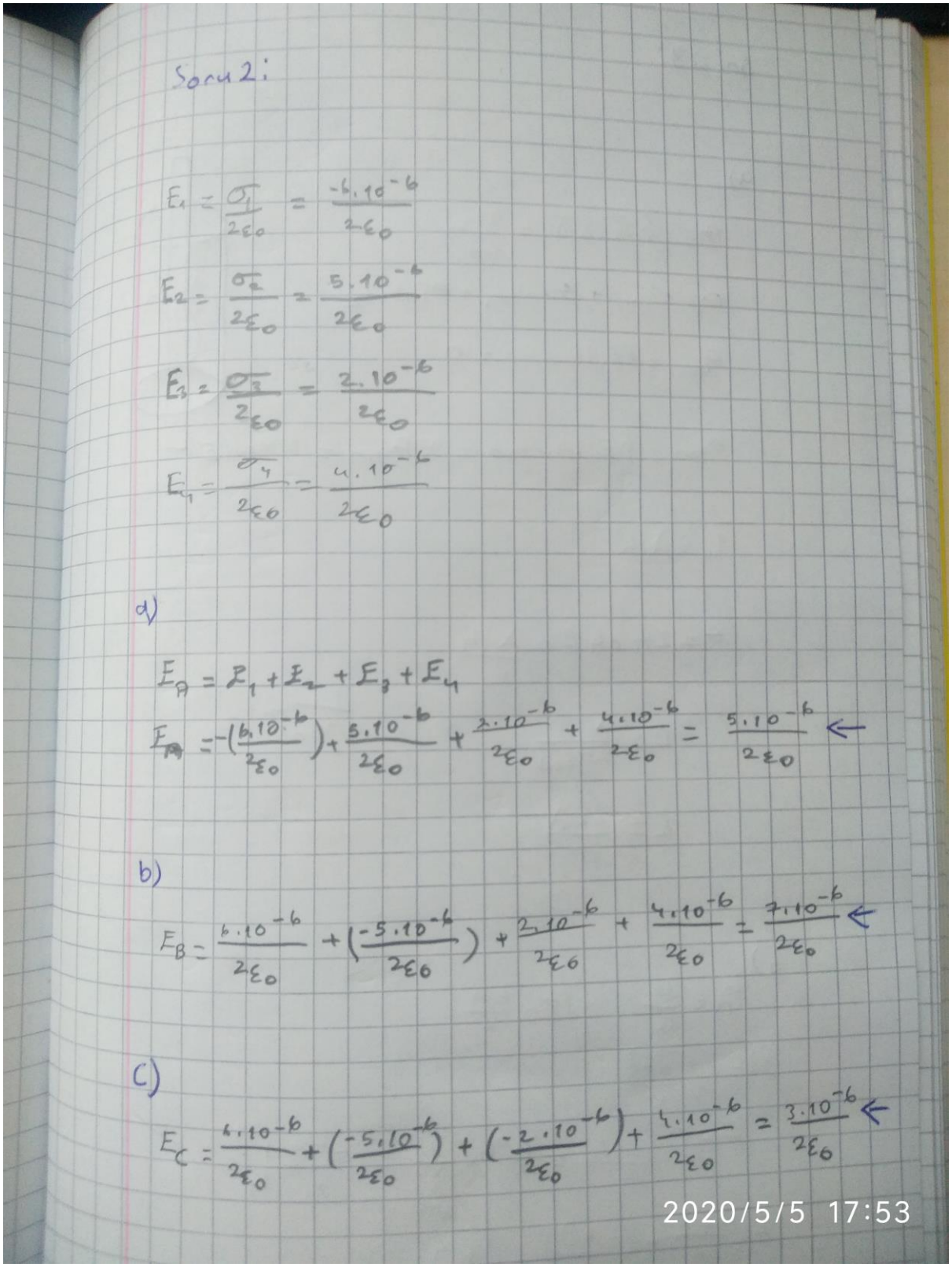
Soru 2:


Soru 2:
$E_1 = \frac{\sigma_1}{2\varepsilon_0} = \frac{-6.10^{-6}}{2\varepsilon_0}$
$E_2 = \frac{\sigma_2}{2\varepsilon_0} = \frac{5.10^{-6}}{2\varepsilon_0}$
$E_3 = \frac{\sigma_3}{2\varepsilon_0} = \frac{2.10^{-6}}{2\varepsilon_0}$
$E_4 = \frac{\sigma_4}{2\varepsilon_0} = \frac{4.10^{-6}}{2\varepsilon_0}$
a)
$E_A = E_1 + E_2 + E_3 + E_4$
$E_A = -\left(\frac{6.10^{-6}}{2\varepsilon_0}\right) + \frac{5.10^{-6}}{2\varepsilon_0} + \frac{2.10^{-6}}{2\varepsilon_0} + \frac{4.10^{-6}}{2\varepsilon_0} = \frac{5.10^{-6}}{2\varepsilon_0}$ ←
b)
$E_B = \frac{6.10^{-6}}{2\varepsilon_0} + \left(\frac{-5.10^{-6}}{2\varepsilon_0}\right) + \frac{2.10^{-6}}{2\varepsilon_0} + \frac{4.10^{-6}}{2\varepsilon_0} = \frac{7.10^{-6}}{2\varepsilon_0}$ ←
c)
$E_C = \frac{6.10^{-6}}{2\varepsilon_0} + \left(\frac{-5.10^{-6}}{2\varepsilon_0}\right) + \left(\frac{-2.10^{-6}}{2\varepsilon_0}\right) + \frac{4.10^{-6}}{2\varepsilon_0} = \frac{3.10^{-6}}{2\varepsilon_0}$ ←
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Soru 3:

Soru 3:

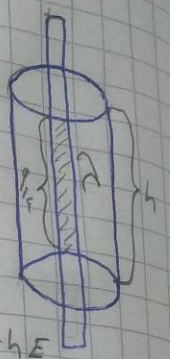
a)

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

$\Theta = \Theta_{yan} + \Theta_{taban_1} + \Theta_{taban_2}$

$\Theta_{taban} = \oint E \cdot dA \cdot \cos 90 = 0$

$\Theta_{yan} = \oint E \cdot dA \cdot \cos 0 = E A_{yan} = 2\pi r h E$



$q_{ic} = \lambda \cdot h$

$\Theta = 2\pi r h E = \frac{\lambda \cdot h}{\varepsilon_0}$

$\frac{1}{4\pi\varepsilon_0} = k$

$E = \frac{\lambda}{2\pi\varepsilon_0 d}$

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

b)

$\lambda = \frac{dq}{dx} \qquad dE = \frac{k\,dq}{x^2}$

$\int dE = \int_a^{2a} \frac{k\,dq}{x^2}$

$E = \int_a^{2a} \frac{k\lambda\,dx}{x^2} = k\lambda \int_a^{2a} \frac{dx}{x^2} = \frac{-k\lambda}{x}\Big|_a^{2a}$

x^{-2}

$E = \frac{-k\lambda}{2a} - \left(\frac{-k\lambda}{a}\right) = \frac{k\lambda}{2a}$

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