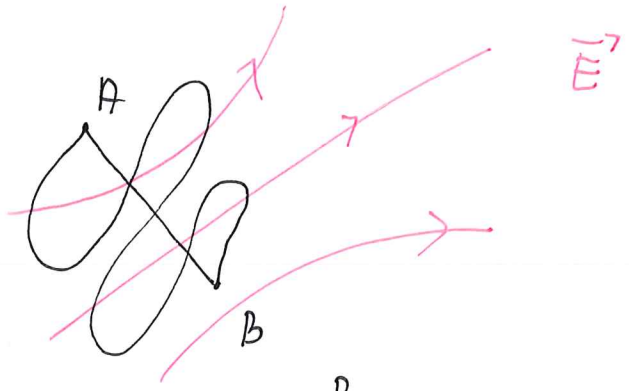
ELECTROSTATIC WORK



$$W = \int_A^B \vec{F} \cdot d\vec{l}$$ conservative force

Does not depend on the path from A to B

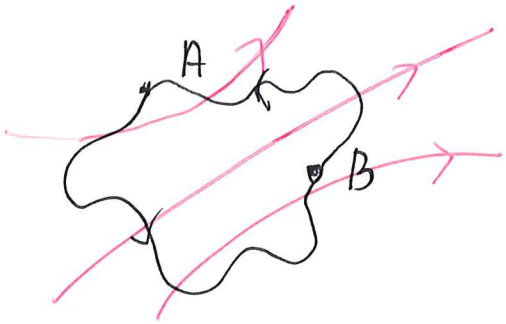
$$W = -\Delta U \quad , \quad V = \frac{U}{q}$$

$$-\Delta U = \int_A^B \vec{F} \cdot d\vec{l} \quad / \cdot q$$

$$-\frac{\Delta U}{q} = \int_A^B \frac{\vec{F}}{q} \cdot d\vec{l}$$

$$\Delta V_{AB} = -\int_A^B \vec{E} \cdot d\vec{l}$$

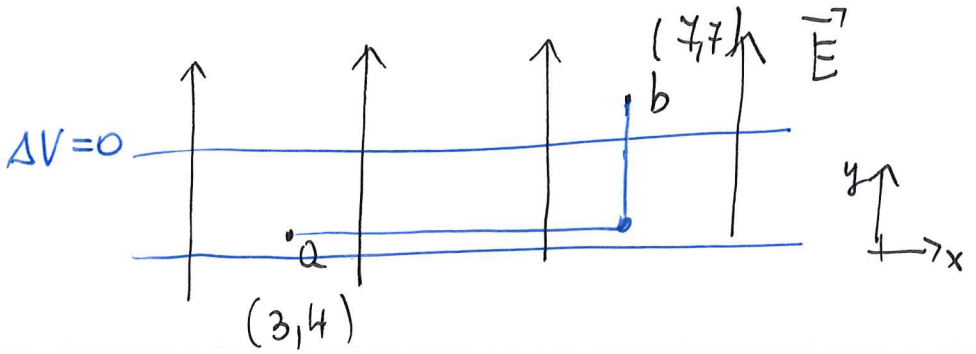
$$\Delta V_{AB} = V_B - V_A$$



$$W = 0$$

$$\oint \vec{E} \cdot d\vec{l} = 0 \qquad \Delta V_{AB} = 0$$

closed line



$$\Delta V_{AB} = \int_A^B \vec{E} \cdot d\vec{l}$$

$$\Delta V_{AB} = \int_A^B E_y \, dy = \int_{0.04\,m}^{0.07\,m} E \cdot dy = E\,[y]_{0.04\,m}^{0.07\,m}$$

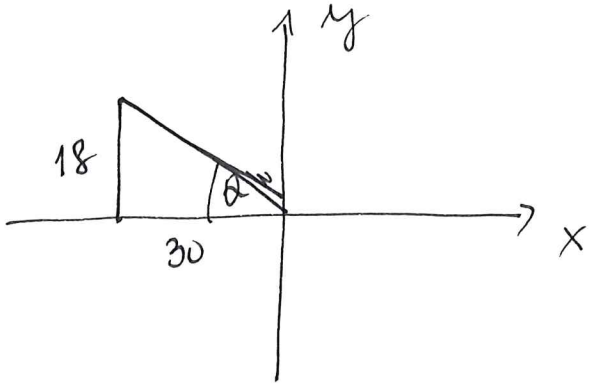
$$\Delta V_{AB} = 6000\ V/m \cdot 0.03\ m = 180\ V$$

$V = 5x^2 - 3y^2$ $\vec{E}$ dirección. $(x,y) = (3m, 3m)$

$$E_x = -\frac{\partial V}{\partial x}\hat{i} = -10x\,\hat{i}$$

$$E_y = -\frac{\partial V}{\partial y}\hat{j} = 6y\,\hat{j}$$

$E_x = -30\,\hat{i}$ $E_y = 18\hat{j}$



$$\tan^{-1} = \left(\frac{18}{30}\right)$$

$31°$