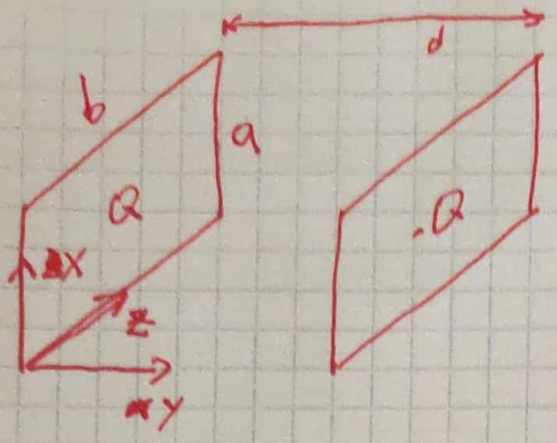
1)



b) i) $V = cte.$

$$\mu = \frac{1}{2}\vec{D}\cdot\vec{E} = \frac{\varepsilon_0}{2}\left(\frac{Q}{\varepsilon_0 ab}\right)^2 = \frac{(\overset{cte}{\overbrace{C}} V_0)^2}{2\varepsilon_0(ab)^2} = \frac{\varepsilon_0 V_0^2}{2d^2}$$

$C = \varepsilon_0 \frac{ab}{d}$

energía almacenada en E entre las placas

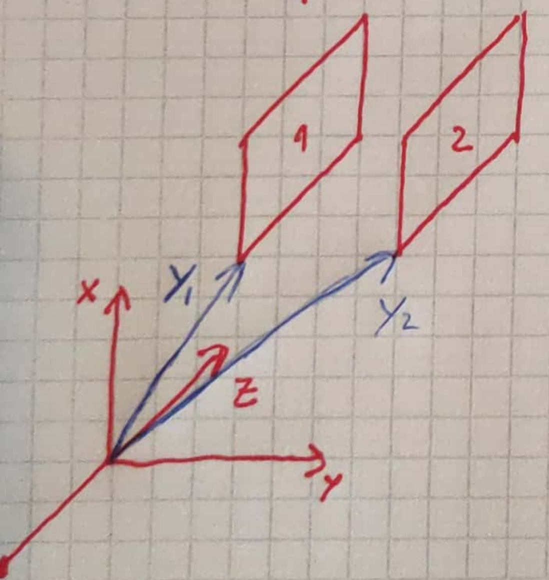
$$U = \int \mu \, dV = \frac{1}{2}\int \vec{D}\cdot\vec{E}\, dV = \frac{\varepsilon_0}{2}\int E^2 dV = \frac{\varepsilon_0}{2} E^2 \cdot abd = \frac{\varepsilon_0 V_0^2 ab}{2d}$$

E cte en el volumen

Para hallar la fuerza sobre la placa derecha:

$$\vec{F} = \nabla U\Big|_V = \frac{\partial U}{\partial d}\Big|_V = \frac{\varepsilon_0 V_0^2 ab}{2}\cdot\left(-\frac{1}{d^2}\right)\hat{j}$$

Obs.: Si quiero calcular la fuerza en la placa izquierda:



$\vec{y}_1$ & $\vec{y}_2$ / $\vec{d} = \vec{y}_2 - \vec{y}_1 = d\hat{j}$

(...) ⇝ análogo

$$U = \frac{\varepsilon_0 V_0^2 ab}{2|\vec{y}_2 - \vec{y}_1|}$$

$$\vec{F}_{\substack{sobre\\1}} = \frac{\partial U}{\partial y_1}\Big|_V = \frac{\varepsilon_0 V_0^2 ab}{2}\left(\frac{-1}{(|\vec{y}_2 - y_1|)^2}\right)\cdot \overbrace{\frac{\partial(y_2 - y_1)}{\partial y_1}}^{-1}\hat{j}$$

$$= \frac{\varepsilon_0 V_0^2 ab}{2}\cdot\left(\frac{-1}{d^2}\right)\cdot(-1)\,\hat{j}$$

$$= \vec{F}_{\substack{sobre\\2}}\cdot(-1)\,\hat{j}$$ ⇝ 3ra ley de Newton ✓