1- $\vec{D} = (3yz)^2 \vec{a}_x + 2y\,\vec{a}_y + (x-y)^3 \vec{a}_z$ $\begin{cases} 1 \le x \le 2 \\ 0 \le y \le 3 \\ 2 \le z \le 4 \end{cases}$

a) $Q = \oint \rho_v \, dV$

b) $Q = \oint D \cdot dS$

$\rho_v = \nabla \cdot \vec{D}$

$\rho_v = \frac{\partial}{\partial x} D_x + \frac{\partial}{\partial y} D_y + \frac{\partial}{\partial z} D_z$

$\rho_v = \frac{\partial}{\partial x}(3yz)^2 + \frac{\partial}{\partial y} 2y + \frac{\partial}{\partial z}(x-y)^3$

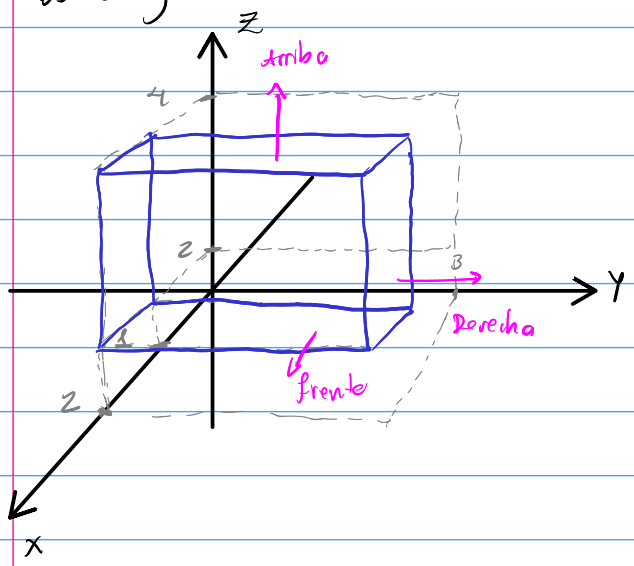
$\rho_v = \frac{\partial}{\partial y} 2y = \underline{2} \ \frac{C}{m^3}$

$\Rightarrow Q = \iiint \rho_v \, dV$

$Q = \int_2^4 \int_0^3 \int_1^2 2 \, dx\, dy\, dz$

$Q = 12 \ C$

b) $Q = \oint D \, dS$



frente $\Rightarrow d\vec{S} = dy\,dz\,\vec{a}_y$

derecha $\Rightarrow d\vec{S} = dx\,dz\,\vec{a}_y$

arriba $\Rightarrow d\vec{S} = dx\,dy\,\vec{a}_z$

1- $\vec{D} = (3yz)^2 \vec{a}_x + 2y\,\vec{a}_y + (x-y)^3 \vec{a}_z$ $\quad \begin{cases} 1 \le x \le 2 \\ 0 \le y \le 3 \\ 2 \le z \le 4 \end{cases}$

a) $Q = \oint \rho_v \, dV$

frente $\Rightarrow d\vec{S} = dy\,dz\,\vec{a}_y$

derecha $\Rightarrow d\vec{S} = dx\,dz\,\vec{a}_y$

arriba $\Rightarrow d\vec{S} = dx\,dy\,\vec{a}_z$

frente

$$Q_1 = \int\int_{x=2} D_x \, dy\,dz$$

atras

$$Q_2 = -\int\int_{x=1} D_x \, dy\,dz$$

$$Q_1 = \int_2^4 \int_0^3 (3yz)^2 \, dy\,dz$$

↖ No tienen ∞

$$Q_2 = \int_2^4 \int_0^3 (3yz)^2 \, dy\,dz$$

↖ no tienen ∞

Q_1 y Q_2 son iguales pero signo contrario...

Derecha

$$Q_3 = \int\int_{y=3} D_y \, dx\, dz$$

$$Q_3 = \int_2^4 \int_1^2 2y \, dx\, dz \quad y=3$$

$$Q_3 \int_2^4 \int_1^2 2\cdot 3 \, dx\, dz$$

$$Q_3 = 12\,C$$

izquierda

$$Q_4 = -\int\int_{y=0} D_y \, dx\, dz$$

$$Q_4 = -\int_2^4 \int_1^2 2y \, dx\, dz \quad y=0$$

$$Q_4 = -\int_2^4 \int_1^2 2\cdot 0 \, dx\, dz$$

$$Q_4 = 0$$

Arriba

$$Q_5 = \int\int D_z \, dx\, dy$$

$$Q_5 = \int\int (x-y)^3 \, dx\, dy$$

↖ No tienen z

Abajo

$$Q_6 = -\int\int D_z \, dx\, dy$$

$$Q_6 = \int_2^4 \int_0^3 (x-y)^3 \, dx\, dy$$

↖ no tienen z

Q_5 y Q_6 son iguales pero signo contrario...

$$Q_{total} = Q_4 + Q_5 = 12\,C$$

~~R b~~