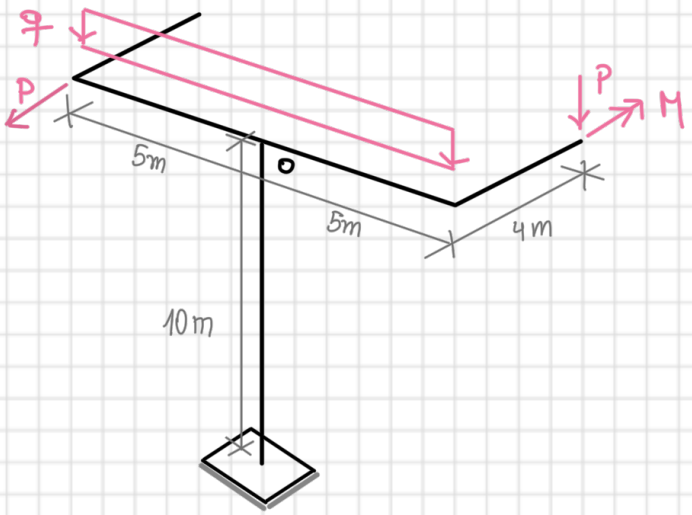
TB036 ESTÁTICA

2025 egs

SOLICITACIONES INTERNAS EN EL ESPACIO (DC3D)

Para la siguiente estructura, se le solicita hallar la sección más solicitada a torsión y a flexión. Resolver sin hallar las RVE

Equilibre el nudo O



$q = 3 kN/m$

$P = 5 kN$

$M = 10 kN m$

Breve repaso

¿Qué cambia en 3D? → son 6 diagramas: N, Q_z, M_y

NEW! M_T, Q_y, M_z

¿Relaciones diferenciales? $\frac{dN}{dx} = -q_x$, $\frac{dQ_z}{dx} = -q_z$, $\frac{dM_y}{dx} = Q_z$ (único sin signo negativo !!)

$\frac{dM_T}{dx} = -m_t$, $\frac{dQ_y}{dx} = -q_y$, $\frac{dM_z}{dx} = -Q_y$

CONVENCIONES COMUNES:

→ Definir terna local:

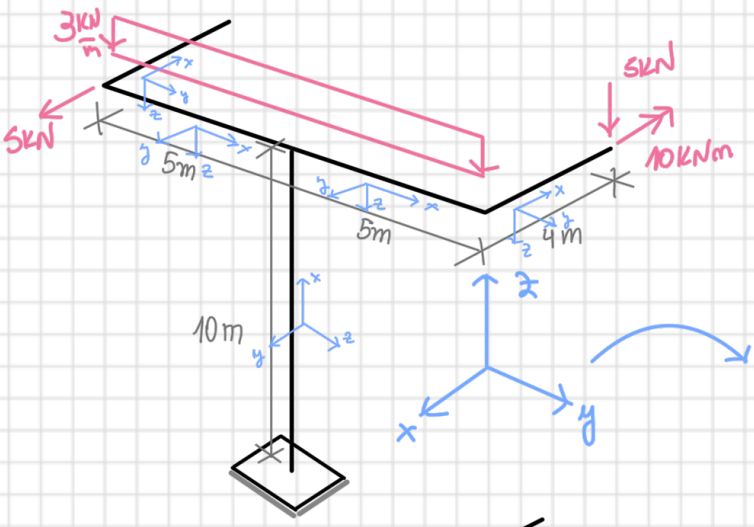
- x → eje de la barra
- z → "hacia abajo" en dirección de la gravedad
- y → regla mano derecha

Misma terna para una barra.

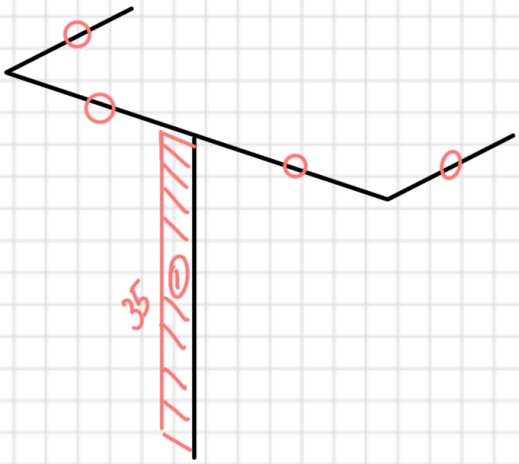
→ PLANO DE DIBUJO:

- PLANO XZ → Q_z, M_y
- PLANO XY → Q_y, M_z

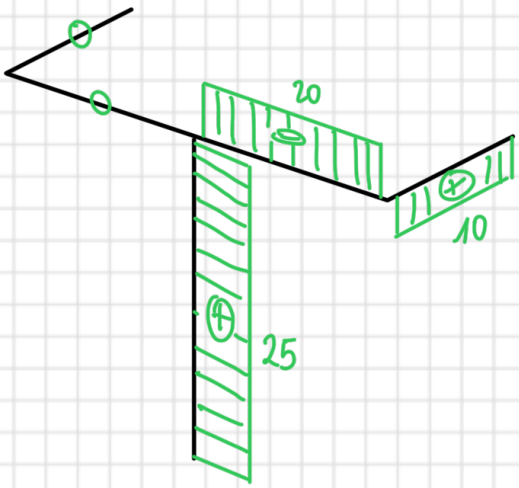
N, M_T pueden ir en cualquiera, recomendamos en el x z !!



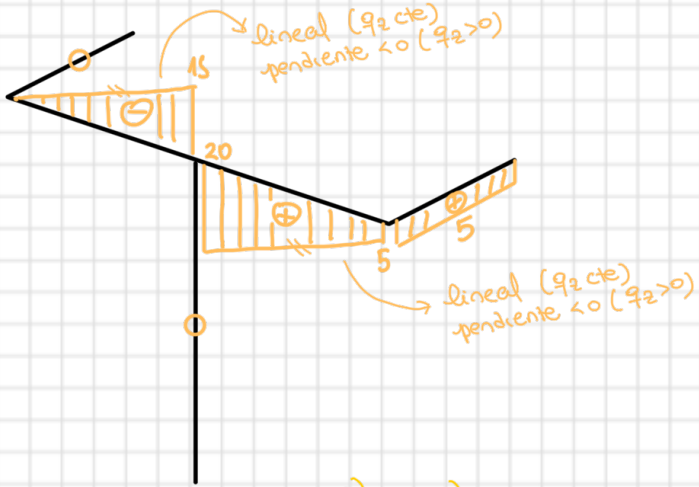
N



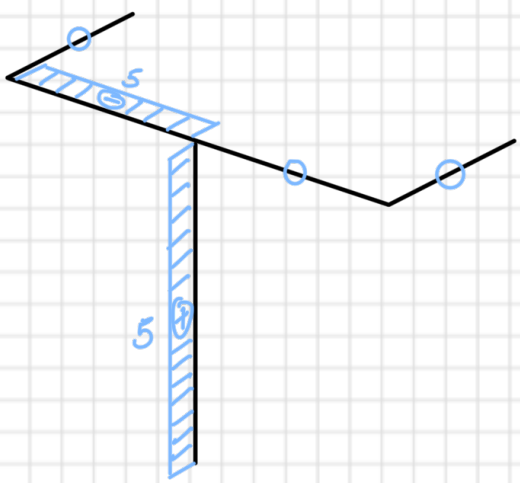
M_t



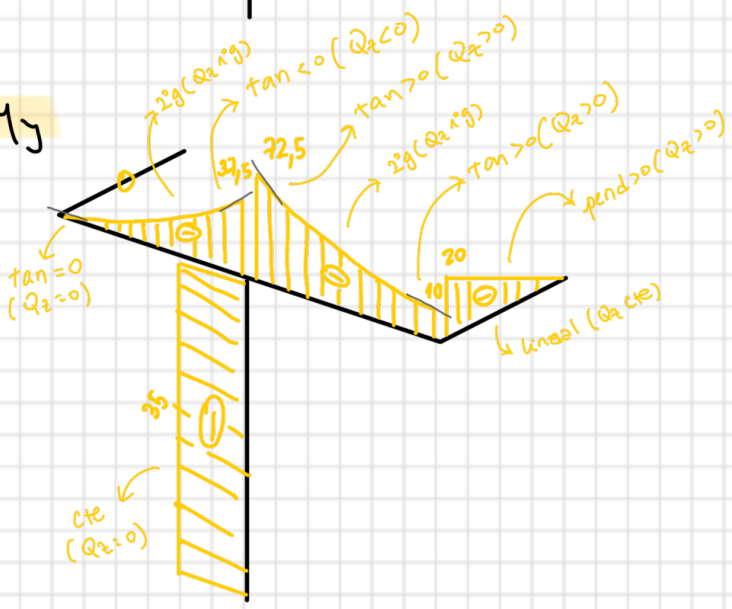
Q_z



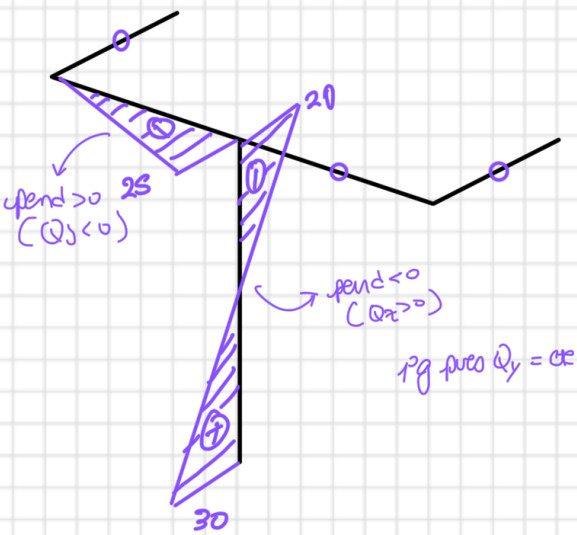
Q_y



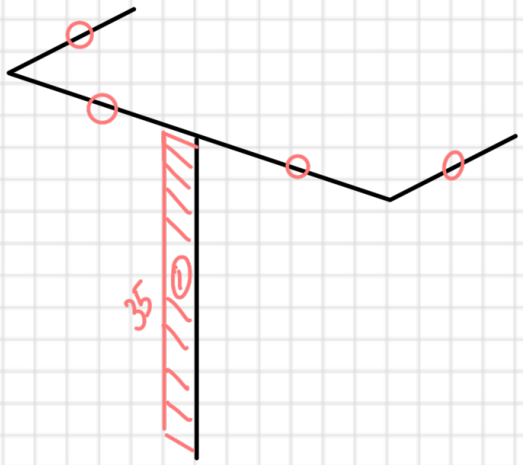
M_y



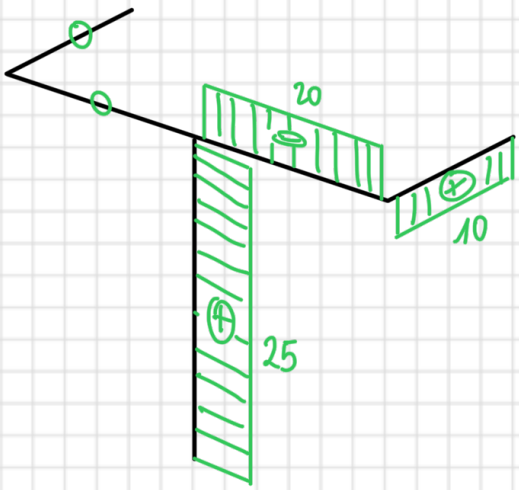
M_z



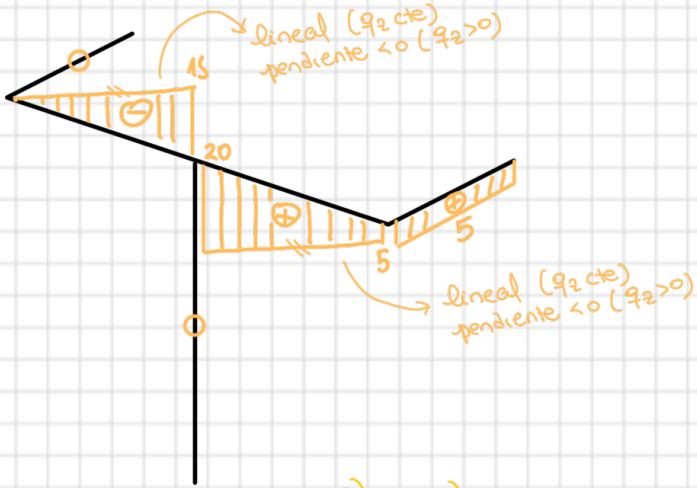
N



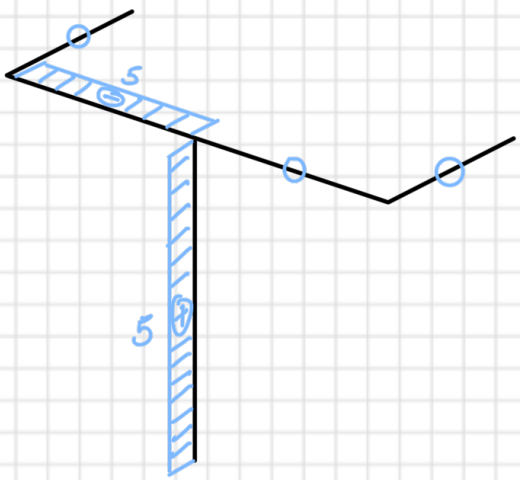
M_T



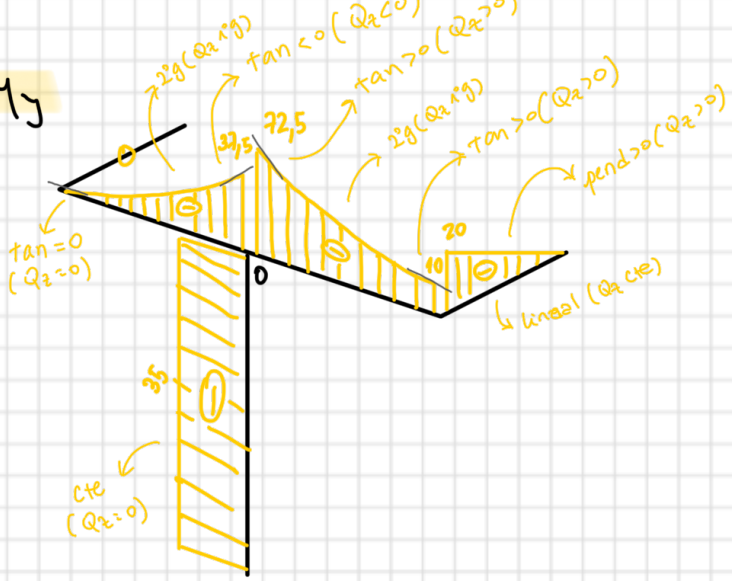
Q_z



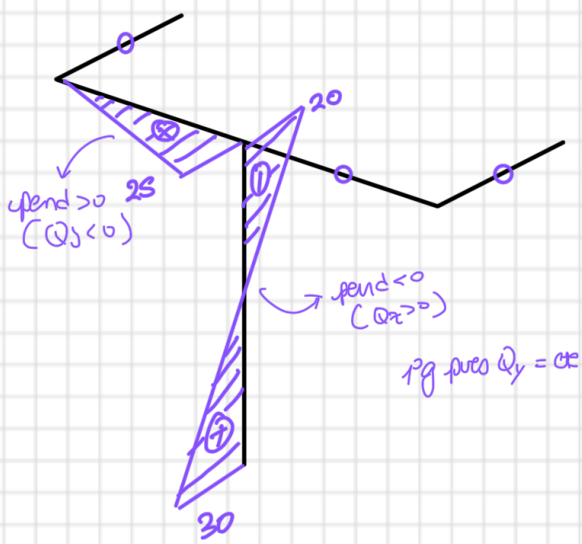
Q_y



M_y



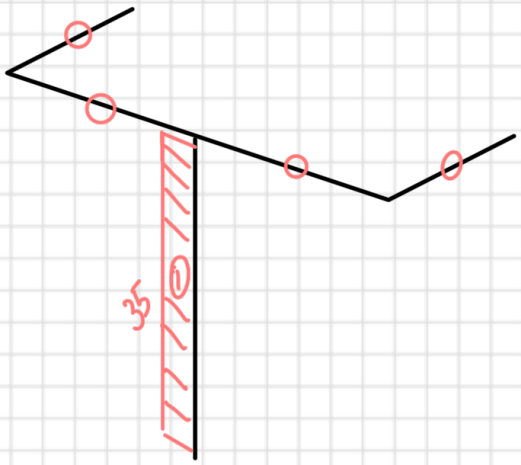
M_z



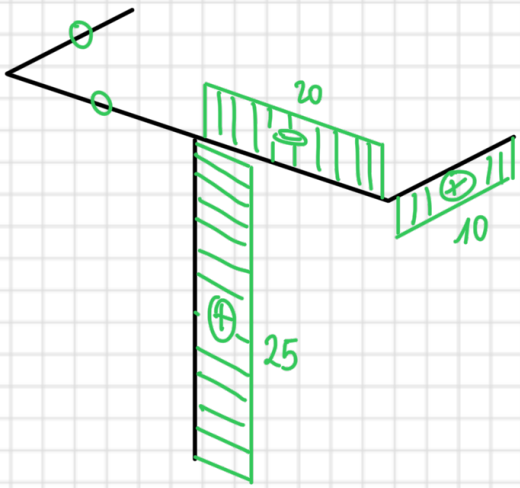
Sección más solicitada a
- Torsión: columna, 25 kNm
- flexión: viga, antes nudo 'o' a la derecha, 72,5 kNm

gs

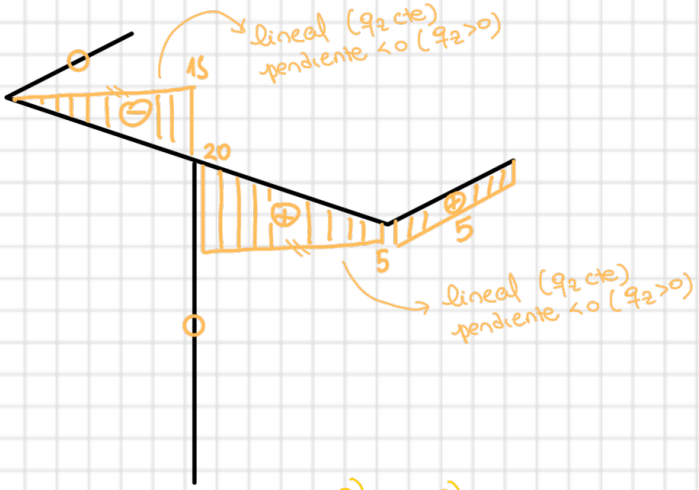
N



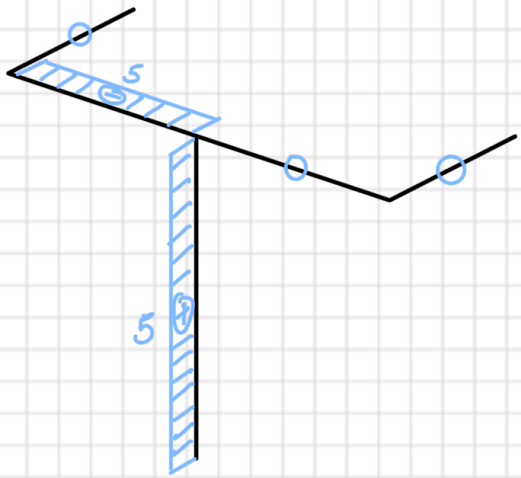
M_T



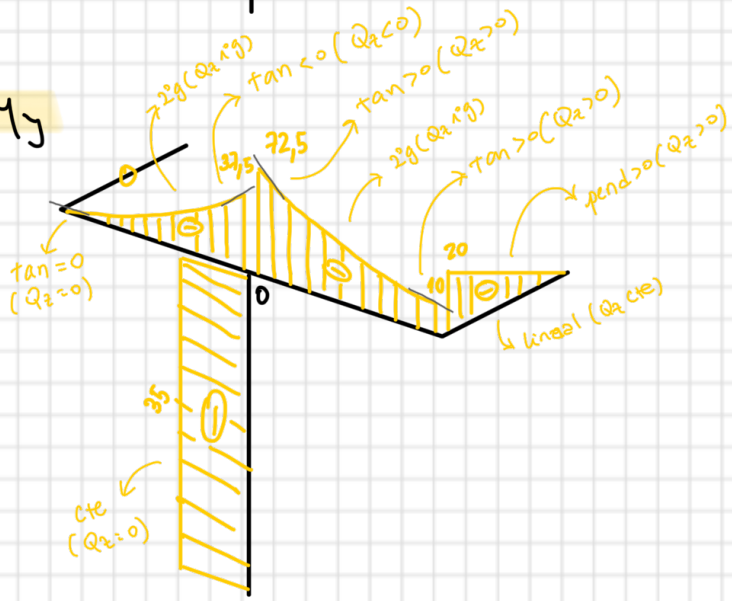
Q_z



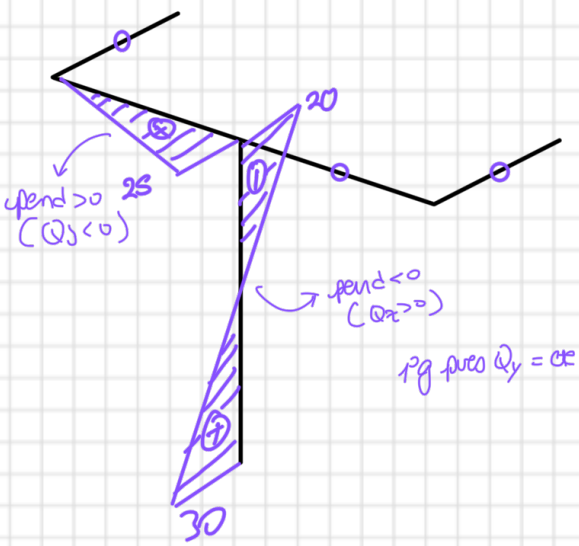
Q_y

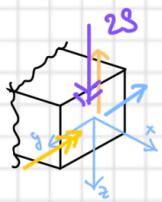


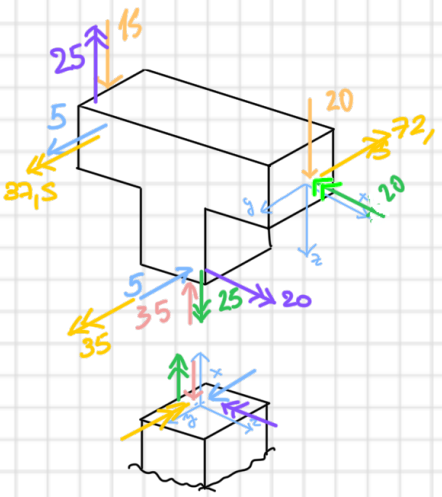
M_y



M_z



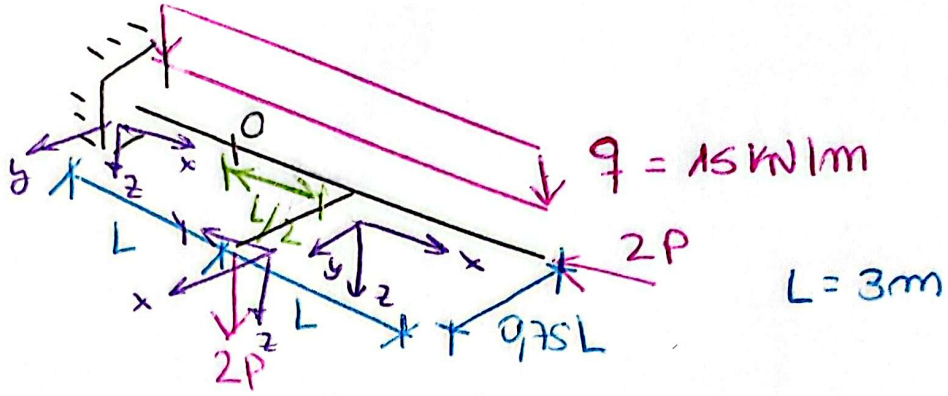




equilibrio nudo O

ys

Para la siguiente ménsula, halle las solicitaciones internas en la sección 'O' de manera óptima.



Obtener las SI en O sin diagramas es sencillo. Con ferne local, reajco el sistema de fuerzas que queda "a derecha" de la sección 'O':

$$\Sigma F_x = -2P = -100kN \longrightarrow N = -100kN$$

$$\Sigma F_y = 0 \longrightarrow Q_y = 0kN$$

$$\Sigma F_z = 2P + q\times\frac{L}{2} + qL = 164,5kN \longrightarrow Q_z = 167,5kN$$

$$\Sigma M_x = +2P \times 0,75L = +225 \longrightarrow M_t = 225\,kNm$$

$$\Sigma M_y = -[qL]\cdot\frac{(L/2)}{2} - qL\left(\frac{L}{2}+\frac{L}{2}\right) - 2P\cdot\frac{L}{2} \longrightarrow M_y = -318,75\,kNm.$$

$$\Sigma M_z = 0 \longrightarrow M_z = 0\,kNm$$

Luego,