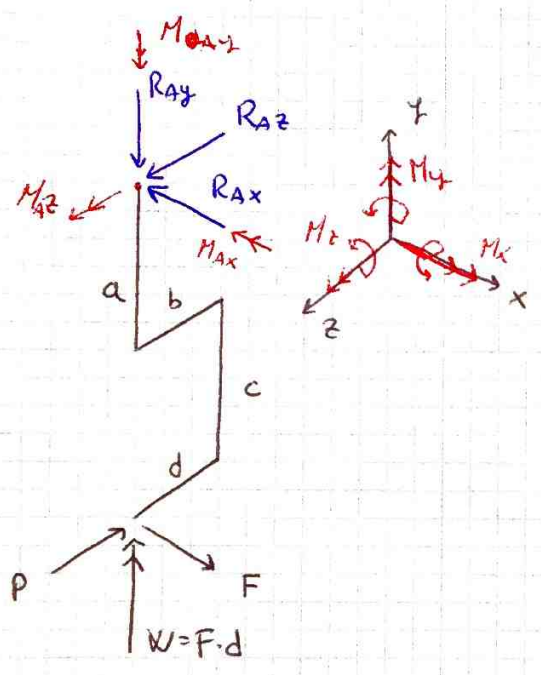
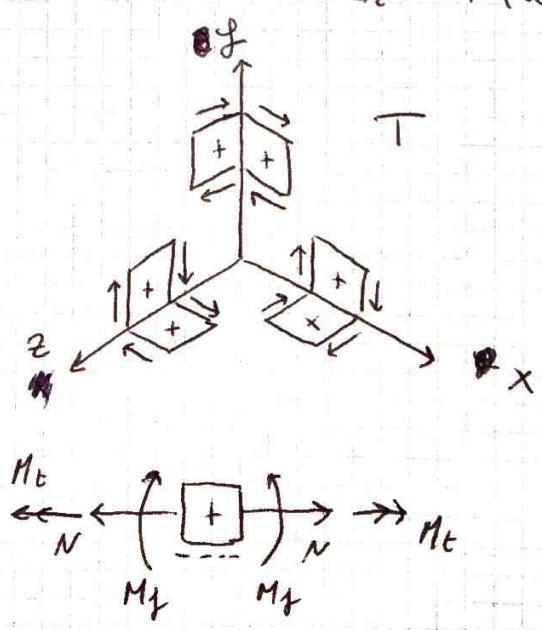
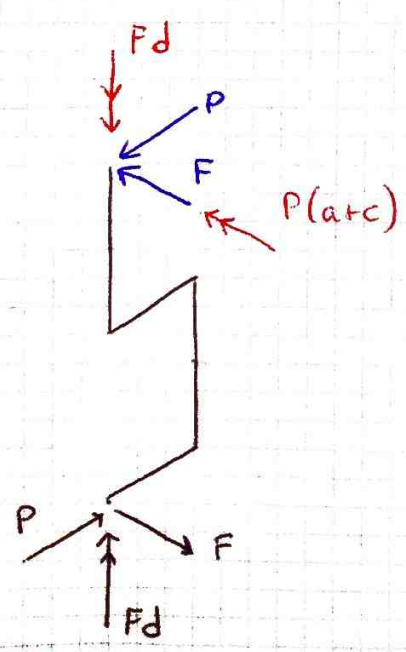


Struttura a forma di albero a gomiti giacente sul piano ZY

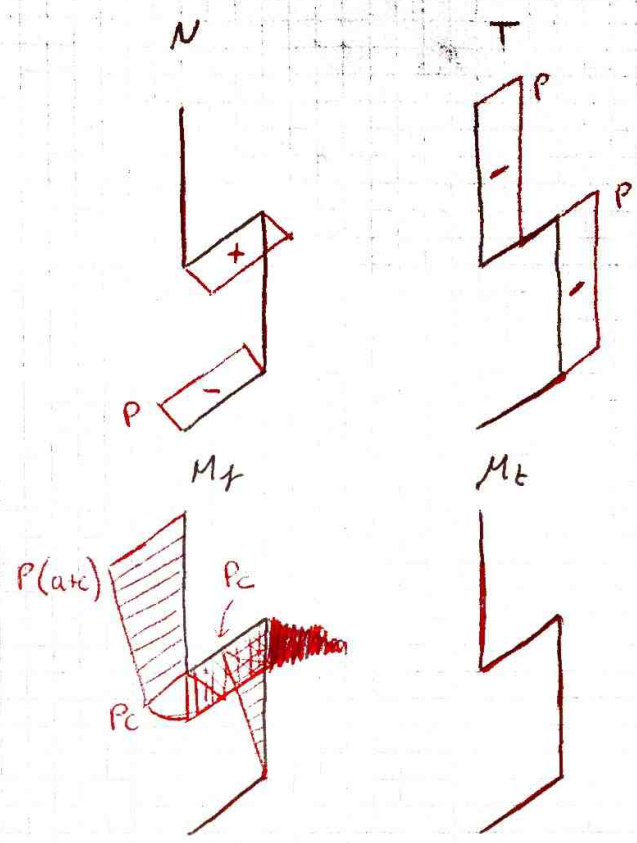
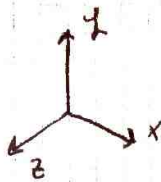
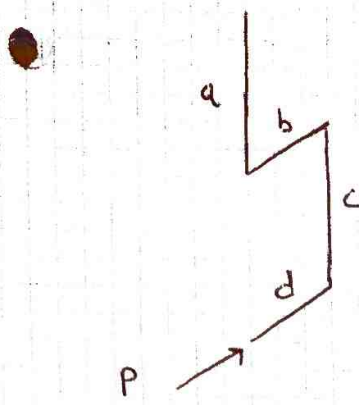
- Tracciare per ogni singola parte i diagrammi delle azioni interne dell'albero
- Rappresentare le forme agenti sulla sezione



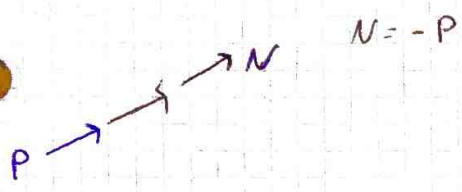
$$\begin{aligned} \sum F_x = 0 & \quad -R_{ax} + F = 0 \quad R_{ax} = F \\ \sum F_y = 0 & \quad -R_{ay} = 0 \quad R_{ay} = 0 \\ \sum F_z = 0 & \quad R_{az} - P = 0 \quad R_{az} = P \\ \sum M_{x,A} = 0 & \quad -M_{ax} + P(a+c) = 0 \\ & \quad M_{ax} = P(a+c) \\ \sum M_{y,A} = 0 & \quad -M_{ay} + Fd = 0 \\ & \quad M_{ay} = Fd \\ \sum M_{z,A} = 0 & \quad M_{az} + F(a+c) = 0 \\ & \quad M_{az} = -F(a+c) \end{aligned}$$



Força P

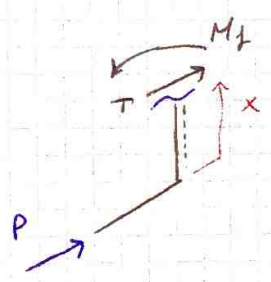


Tramo d



$$N = -P$$

Tramo c

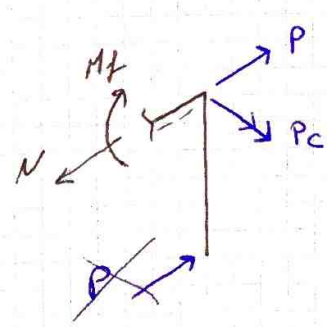


$$T = -P$$

$$M_f + P_x = 0$$

$$M_f = -P_x$$

Tramo b

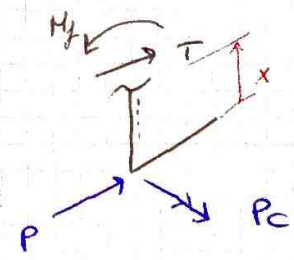


$$N = P$$

$$-M_f + P_c = 0$$

$$M_f = P_c$$

Tramo a



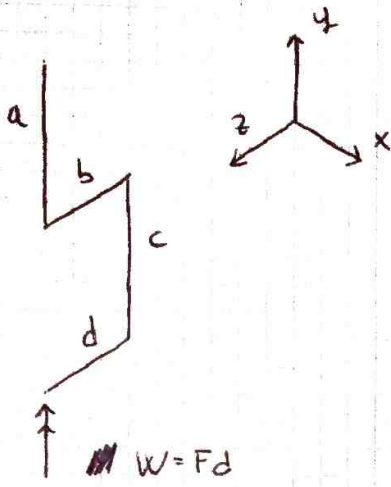
$$T = -P$$

$$M_f + P_c + P_x = 0$$

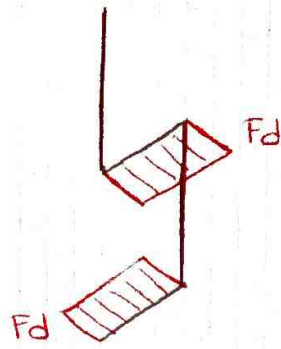
$$M_f = -P_c - P_x$$

Momento

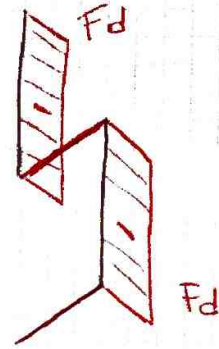
W



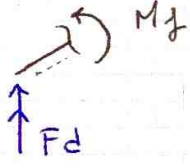
M_f



M_t



Tramo d



$$M_f = -F_d$$

Tramo c



$$M_t = -F_d$$

Tramo b

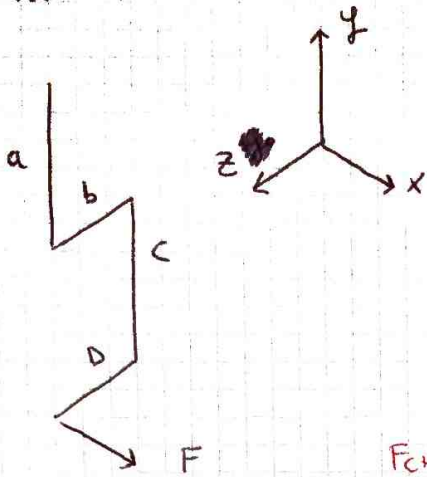


$$-M_f + F_d = 0$$

$$M_f = F_d$$

Tramo a analogo al tramo c

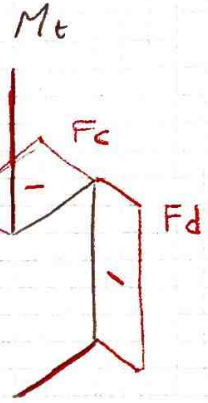
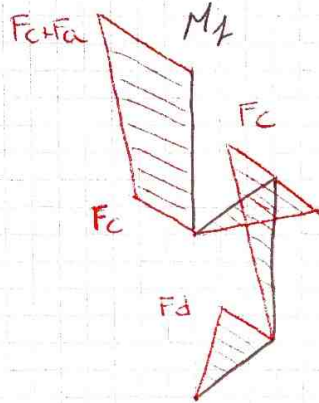
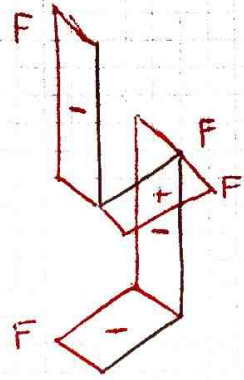
Forma F



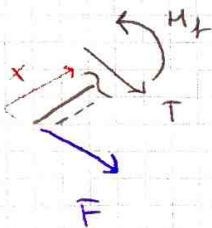
N



T



Tramo d

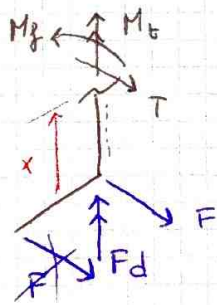


$$T = -F$$

$$M_z + Fx = 0$$

$$M_z = -Fx$$

Tramo c



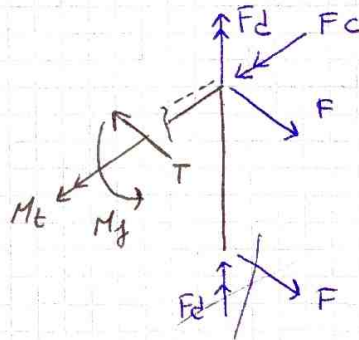
$$T = -F$$

$$M_t = -Fd$$

$$M_z + Fx = 0$$

$$M_z = -Fx$$

Tramo b



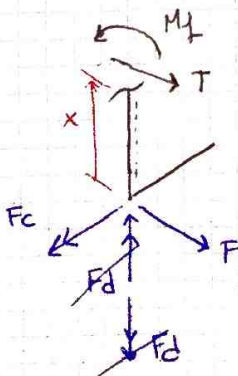
$$T = F$$

$$M_t = -Fc$$

$$M_z + Fd - Fx = 0$$

$$M_z = Fx - Fd$$

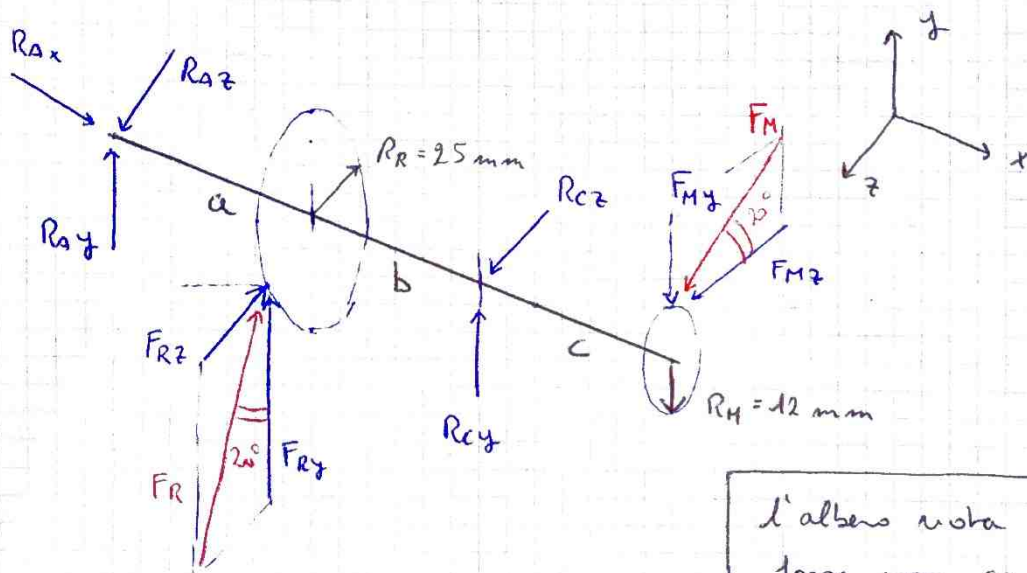
Tramo a



$$T = -F$$

$$M_z + Fc + Fx = 0$$

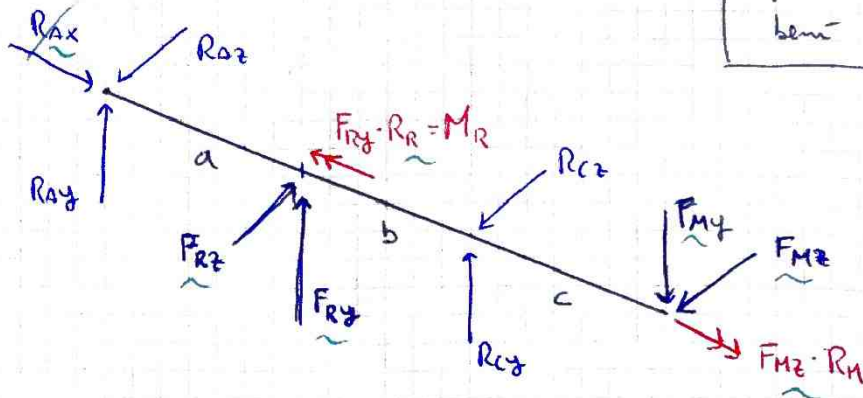
$$M_z = -Fx - Fc$$



l'albero nota ma le
forze non cambiano,
bene i momenti fissi

$$F_{My} = 342,02 \text{ N}$$

$$F_{Mz} = 939,7 \text{ N}$$

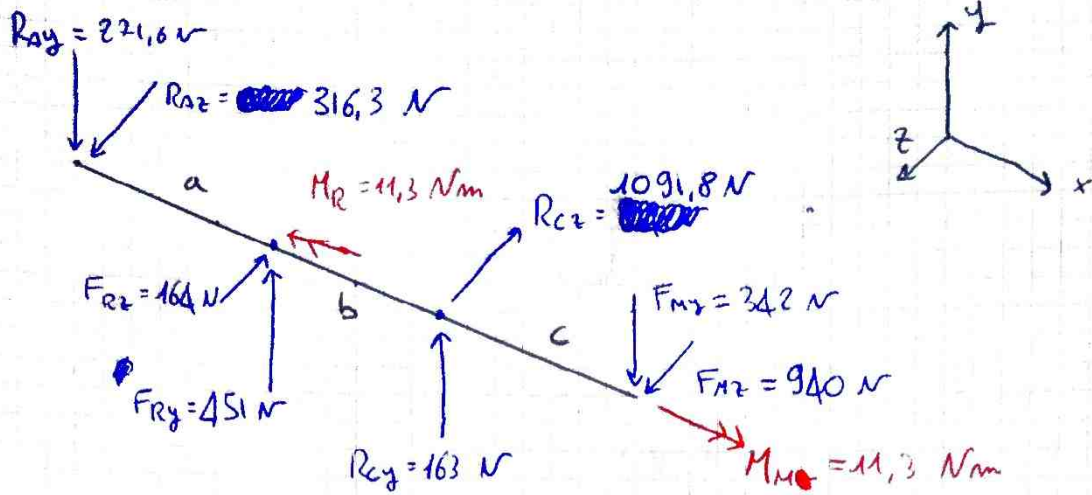


Reazioni vincolari

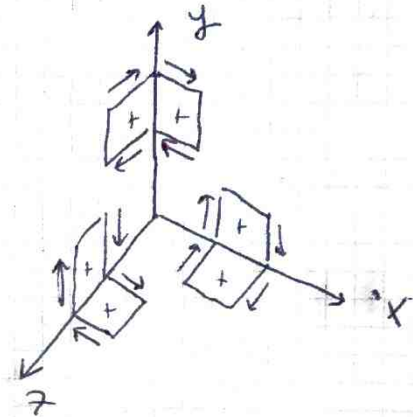
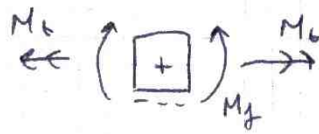
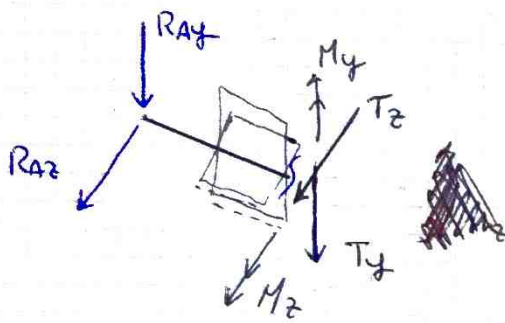
$$\sum M_x = 0 \quad F_{Mz} \cdot R_H - F_{Ry} \cdot R_R = 0 \quad F_{Ry} = F_{Mz} \frac{R_H}{R_R} = 451 \text{ N}$$

$$\sum F_x = 0 \quad R_{ax} = 0 \quad F_R = 480 \text{ N}$$

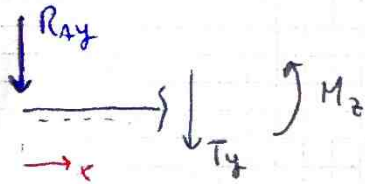
$$F_{Rz} = 164,17 \text{ N}$$



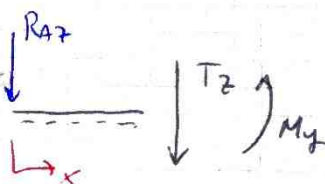
Tramo a



Piano (y-x)



Piano (z-x)



$$T_y = -R_{Ay} = -272 \text{ N}$$

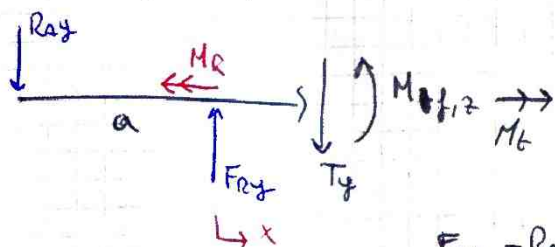
$$T_z = -R_{Az} = -316,3 \text{ N}$$

$$M_z = -R_{Ay} x$$

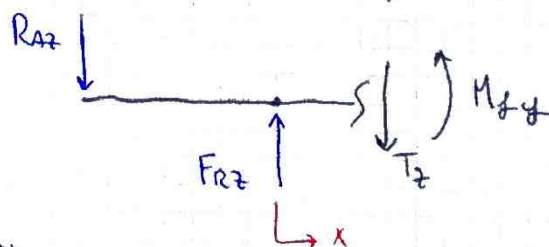
$$M_y = -R_{Az} x$$

Tramo b

Piano (y-x)



Piano (z-x)



$$-T_y - R_{Ay} + F_{Ry} = 0 \quad T_y = F_{Ry} - R_{Ay} = 179 \text{ N}$$

$$F_{Rz} - R_{Az} - T_z = 0 \quad T_z = F_{Rz} - R_{Az} = -152,3 \text{ N}$$

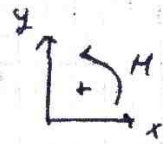
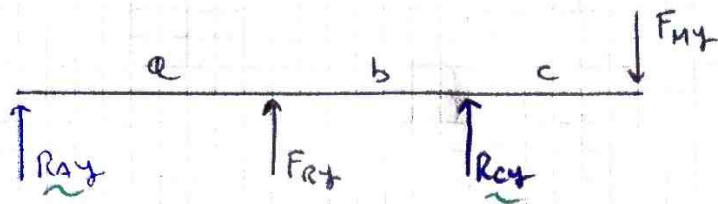
$$M_{f,z} - F_{Ry} x + R_{Ay} (a+x) = 0$$

$$M_{f,y} - F_{Rz} x + R_{Az} (a+x) = 0$$

$$M_t - M_R = 0 \quad M_{f,z} = F_{Ry} x - R_{Ay} (a+x)$$

$$M_{t,y} = F_{Rz} x - R_{Az} (a+x)$$

Piano $x-y$



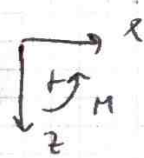
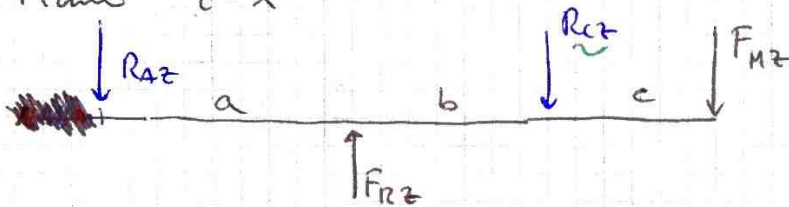
$$\sum M_{z(A)} = 0 \quad F_{Fry} \cdot a + R_{Cy} (a+b) - F_{My} (a+b+c) = 0$$

$$R_{Cy} (a+b) = F_{My} (a+b+c) - F_{Fry} \cdot a \Rightarrow R_{Cy} = 162,6 \text{ N}$$

$$\sum F_y = 0$$

$$R_{Ay} + F_{Fry} + R_{Cy} - F_{My} = 0 \quad R_{Ay} = F_{My} - F_{Fry} - R_{Cy} = -271,6 \text{ N}$$

Piano $z-x$



$$\sum M_y(A) = 0$$

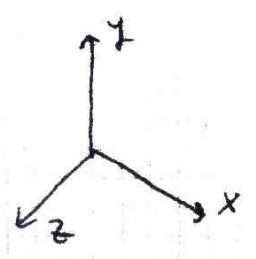
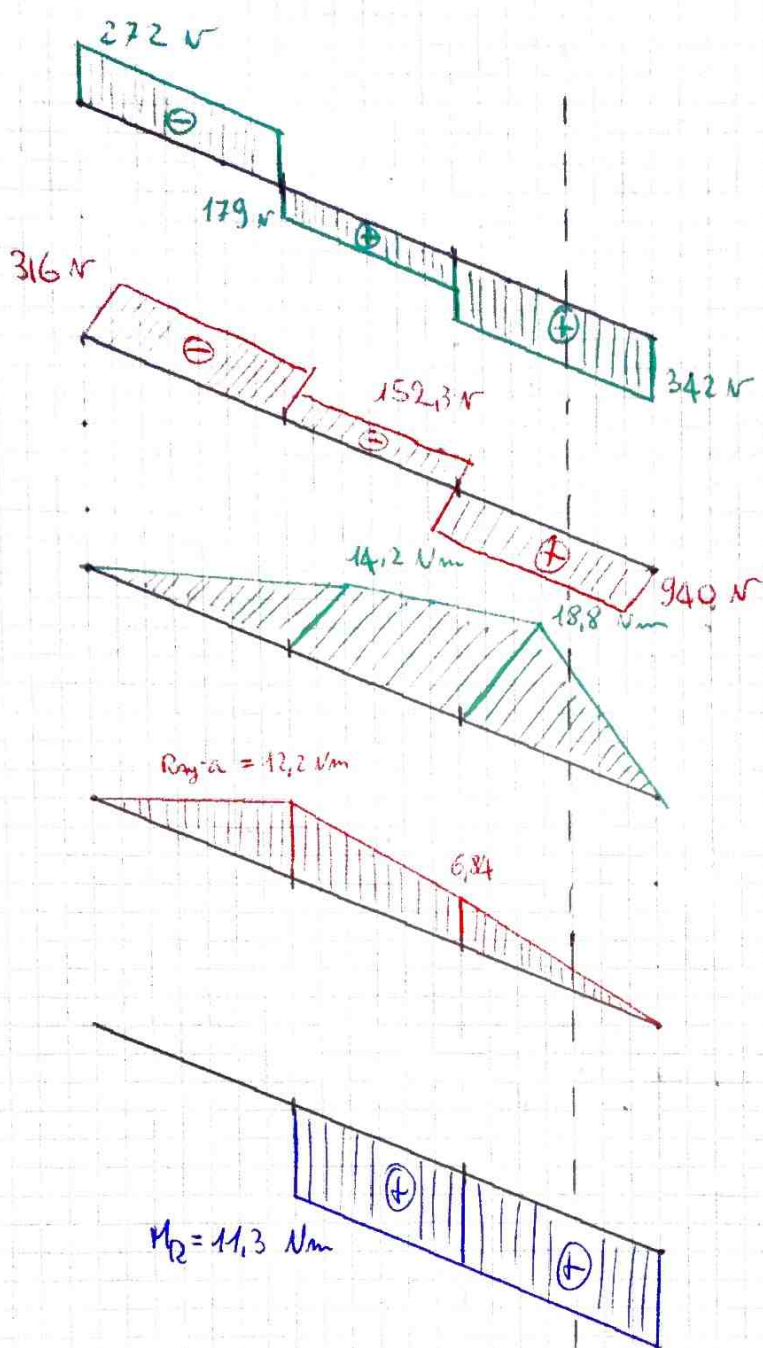
$$F_{Fz} \cdot a - R_{Cz} (a+b) - F_{Mz} (a+b+c) = 0$$

$$R_{Cz} = \frac{1}{a+b} (F_{Fz} \cdot a - F_{Mz} (a+b+c)) = ~~1091,8 \text{ N}~~ - 1091,8 \text{ N}$$

$$\sum F_z = 0$$

$$-R_{Az} + F_{Fz} - R_{Cz} - F_{Mz} = 0$$

$$R_{Az} = F_{Fz} - R_{Cz} - F_{Mz} = ~~316,3 \text{ N}~~ 316,3 \text{ N}$$



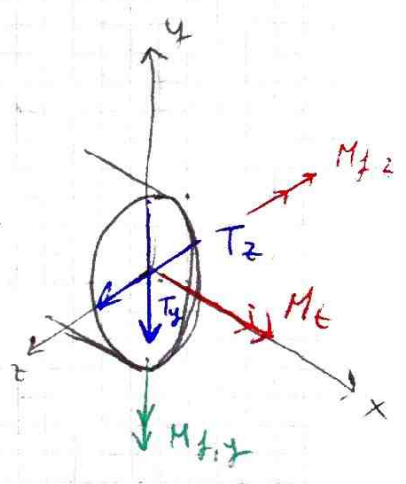
T_y

T_z

$M_{y,z}$

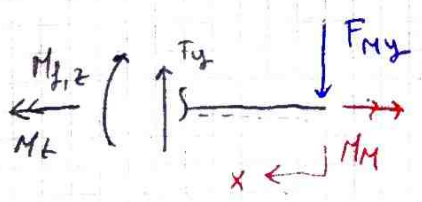
$M_{y,z}$

M_t



Tronco c

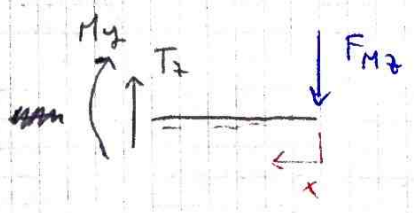
Piano (y-x)



$T_y = F_{My} = 342 \text{ N}$

$M_t = M_M$

Piano z-x



$T_z = F_{Mz} = 940 \text{ N}$