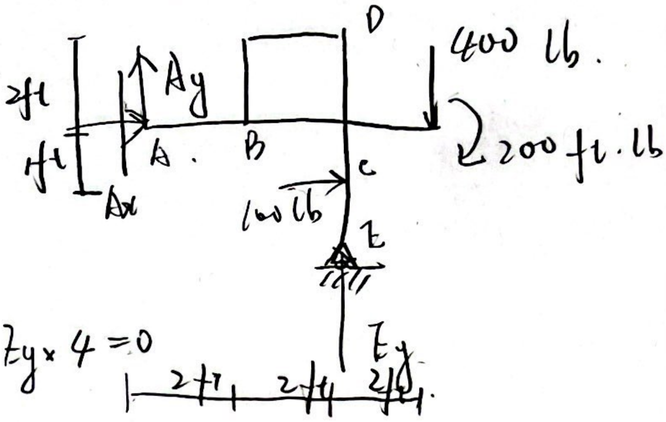
Pb1

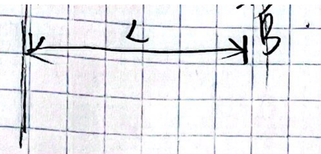
$$\begin{cases} \sum F_x = 0 & A_x + 100 = 0 \\ \sum F_y = 0 & A_y - 400 + E_y = 0 \\ \sum M_A = 0 & 100 \times 1 - 200 - 400 \times 6 + E_y \times 4 = 0 \end{cases}$$



$A_x = -100$ lb

$A_y = -225$ lb

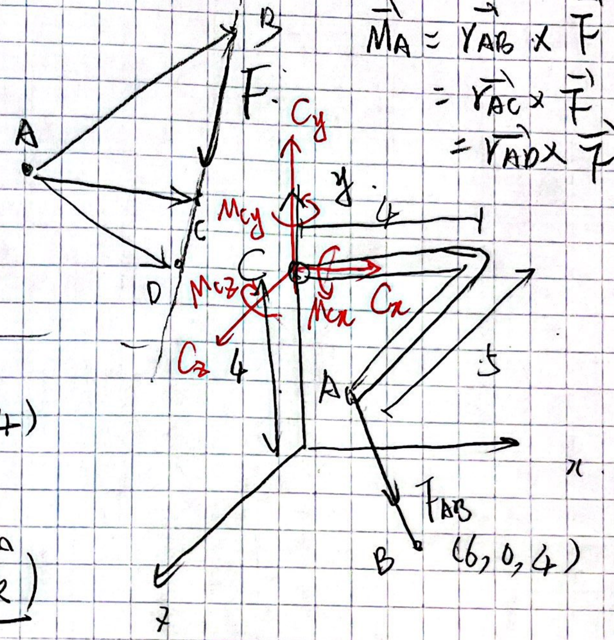
$E_y = 625$ lb



Pb2 : For 3D moment.

$$\vec{M} = \vec{r} \times \vec{F}$$

$$\vec{M}_A = \vec{r}_{AB} \times \vec{F}$$
$$= \vec{r}_{AC} \times \vec{F}$$
$$= \vec{r}_{AD} \times \vec{F}$$



A (4, 4, 5) , B (6, 0, 4)

$$\vec{F}_{AB} = |F_{AB}|\, \vec{e}_{AB}$$
$$= 800 \frac{(2\vec{i} - 4\vec{j} - \vec{k})}{\sqrt{21}}$$

At point C: $\Sigma \vec{F} = 0$

$\Sigma F_x = 0$ $\Sigma F_y = 0$ $\Sigma F_z = 0$

$\Sigma \vec{M} = 0$. $\Sigma M_x = 0$ $\Sigma M_y = 0$ $\Sigma M_z = 0$

$$\vec{M}_F = \vec{r}_{CA} \times \vec{F}_{AB}$$

$$\vec{r}_{CA} = 4\vec{i} + 5\vec{k}$$ C (0, 4, 0).

$$\vec{M}_F = (4\vec{i} + 5\vec{k}) \times 800 \cdot \frac{(2\vec{i} - 4\vec{j} - \vec{k})}{\sqrt{21}}$$

$$= \frac{800}{\sqrt{21}} \left(-16\vec{k} + 4\vec{j} + 10\vec{j} + 20\vec{i} \right).$$

$$= 3491\vec{i} + 2444\vec{j} - 2793\vec{k}$$

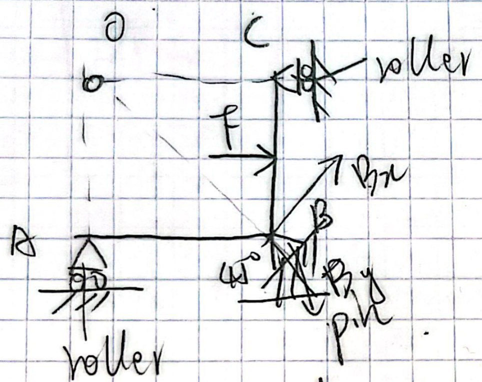
$$\begin{cases} \sum F_x = 0 & C_x + \frac{800}{\sqrt{21}} \cdot 2 = 0. & C_x = -349\,lb \\ \sum F_y = 0 & C_y - \frac{800}{\sqrt{21}} \cdot 4 = 0. & C_y = 698\,lb \\ \sum F_z = 0 & C_z - \frac{800}{\sqrt{21}} = 0. & C_z = 175\,lb. \end{cases}$$

$\sum M_x = 0$

$$\begin{cases} M_{cx} + \overset{3491}{M_{Fx}} = 0. & M_{cx} = -3491\ ft \cdot lb \\ M_{cy} + \overset{2444}{M_{Fy}} = 0. & M_{cy} = -2444\ ft\,lb \\ M_{cz} + \overset{-2793}{M_{Fz}} = 0. & M_{cz} = 2793\ ft \cdot lb. \end{cases}$$

Pb 3

①

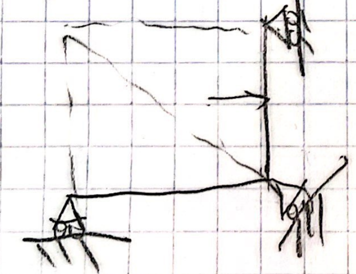


If it will not remain in equilibrium under the action of loads on it.

$\boxed{\text{improperly supported.}}$

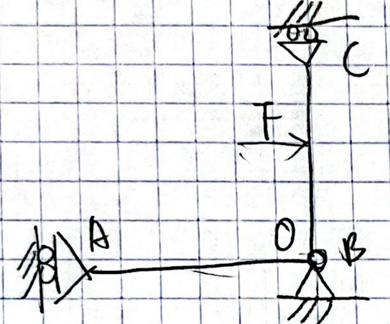
$\frac{L}{2}F + \sqrt{2}L\,B_x = 0$.

$B_x = -\frac{1}{2\sqrt{2}}F$.



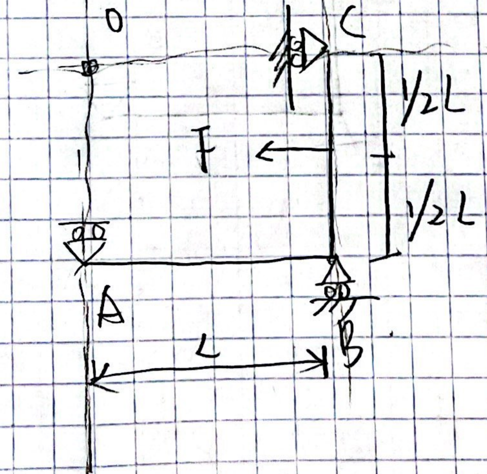
1

5



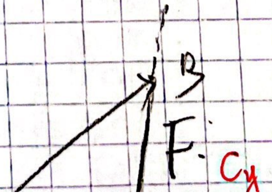
improperly supported.

3



$\overset{+}{\circlearrowleft})\ F\,\tfrac{1}{2}L - F_B L = 0.$

$F_B = \frac{1}{2}F.$



$\vec{M}_A = \vec{r}_{AB} \times \vec{F}$

$= \vec{r}_{AC} \times \vec{F}$