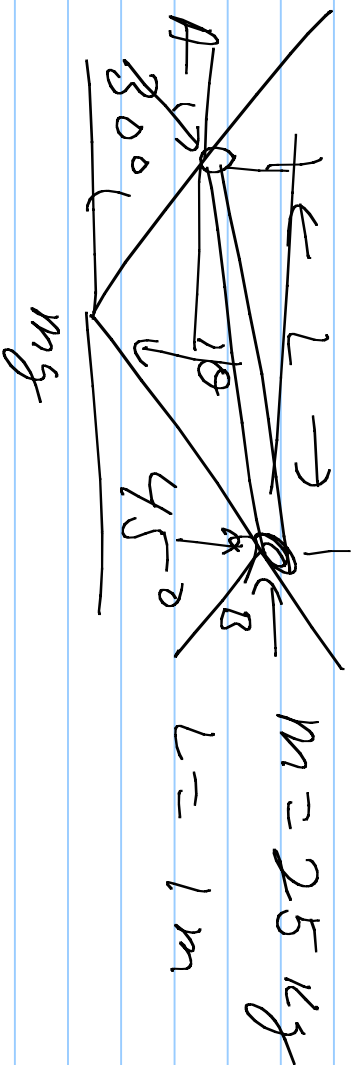


EGR 180 211

6-64)



$$\sum M_A = -\frac{L}{2} \cos \theta \cdot mg + B \cos 45^\circ \cdot L \cos \theta$$

$$+ B \sin 45^\circ \cdot L \sin \theta = 0$$

$$B = \frac{mg \cos \theta}{\sqrt{2} (\sin \theta + \cos \theta)}$$

$$\sum M_B = \frac{L}{2} \cos \theta \cdot mg - L \cos \theta \cdot A \sin (30^\circ) + L \sin \theta \cdot A \cos 30^\circ = 0$$

$$A = \frac{\frac{1}{2} m g \cos \theta}{\cos \theta \sin(30) - \sin \theta \cos(30)}$$

$$\sum F_x = 0 = A \cos(30) - B \cos 45 = 0$$

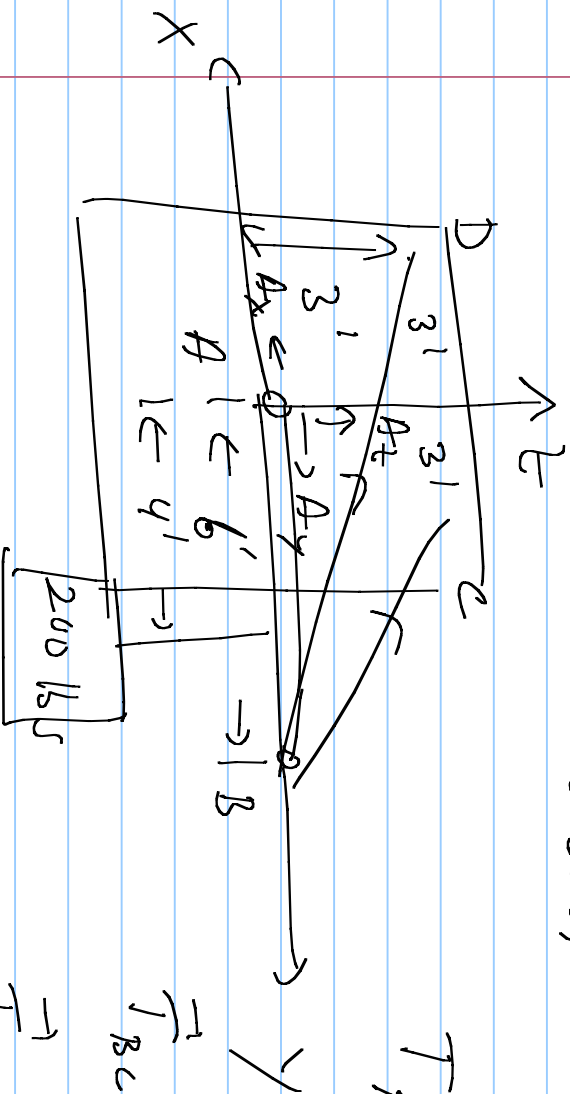
$$A = B \frac{\cos(45)}{\cos(30)}$$

$$\frac{\cancel{\frac{1}{2} m g \cos \theta}}{\sin(30 - \theta)} = \frac{\cancel{m g \cos \theta}}{R (\cos \theta + \sin \theta)} \cdot \frac{\cos(45)}{\cos(30)}$$

$$\cos(30) (\cos \theta + \sin \theta) = \sin(30) \cos \theta - \cos(30) \sin \theta$$

$$(\cos(30) - \sin(30)) \cos \theta = -2 \cos(30) \sin \theta$$

$$\tan(\theta) = \frac{\cos(30) - \sin(30)}{-2 \cos(30)} \Rightarrow \theta = 11.9^\circ$$



$$T_{BC} + T_{BD}, F_\theta$$

$$\vec{T}_{BC} = R_{BC} (-3\hat{i} - 6\hat{j} + 3\hat{k})$$

$$\vec{T}_{BD} = R_{BD} (3\hat{i} - 6\hat{j} + 3\hat{k})$$

$$\sum \vec{M}_A = 4\hat{j} \times (-200\hat{k}) + 6\hat{j} \times (\vec{T}_{BC} + \vec{T}_{BD})$$

$$= -800\hat{i} + 18R_{BC}\hat{k} + 18R_{BD}\hat{i} - 18R_{BD}\hat{k} + 18R_{BD}\hat{i} = 0$$

$$\sum \uparrow: -800 + 18 R_{Bc} + 18 R_{Bd} = 0 \rightarrow 36 R_{Bc} = 800 \Rightarrow$$

$$\uparrow R: 18 R_{Bc} - 18 R_{Bd} = 0 \Rightarrow R_{Bc} = R_{Bd} \quad R_{Bc} = 22.2165$$

$$\sum F_x = A_x + 3 R_{Bd} - 3 R_{Bc} = 0 \Rightarrow A_x = 0$$

$$\sum F_y = A_y - 6 R_{Bd} - 6 R_{Bc} = 0$$

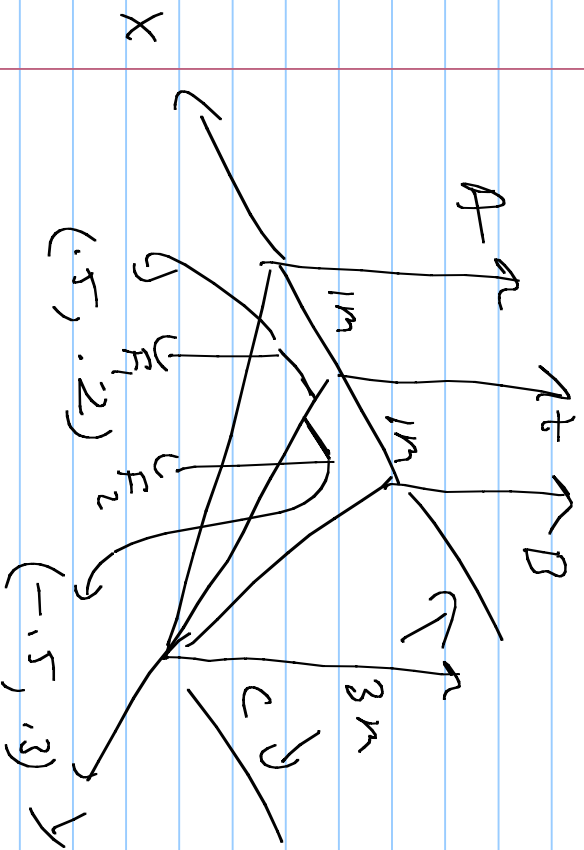
$$A_y = 266.7165$$

$$\sum F_z = 3 R_{Bd} + 3 R_{Bc} - 200 + A_z = 0$$

$$A_z = 66.7165$$

$$T_{BC} = T_{DB} = 2 \cdot 22.2 \left[3^2 + 4^2 + 3^2 \right]^{1/2}$$

$$= 163.3 \text{ lbs}$$



$$F_1 = 15000 \text{ N}$$

$$F_2 = 15000 \text{ N}$$

$$\sum \vec{M}_C = (\hat{i} - 3\hat{j}) \times A\hat{k} + (-\hat{i} - 3\hat{j}) \times B\hat{k} + (\hat{i}\hat{i} - 2.8\hat{j}) \times (-1000\hat{k})$$

$$(-1.5\hat{i} - 2.7\hat{j}) \times (-1500\hat{k}) = 0$$

$$-A \uparrow - \underline{340} + B \downarrow - \underline{380} + \underline{500} + \underline{2800}$$
$$= \underline{2500} + \underline{4050} = 0$$

$$i: -3A - 3B + 6850 = 0$$

$$j: -A + B - 250 = 0$$

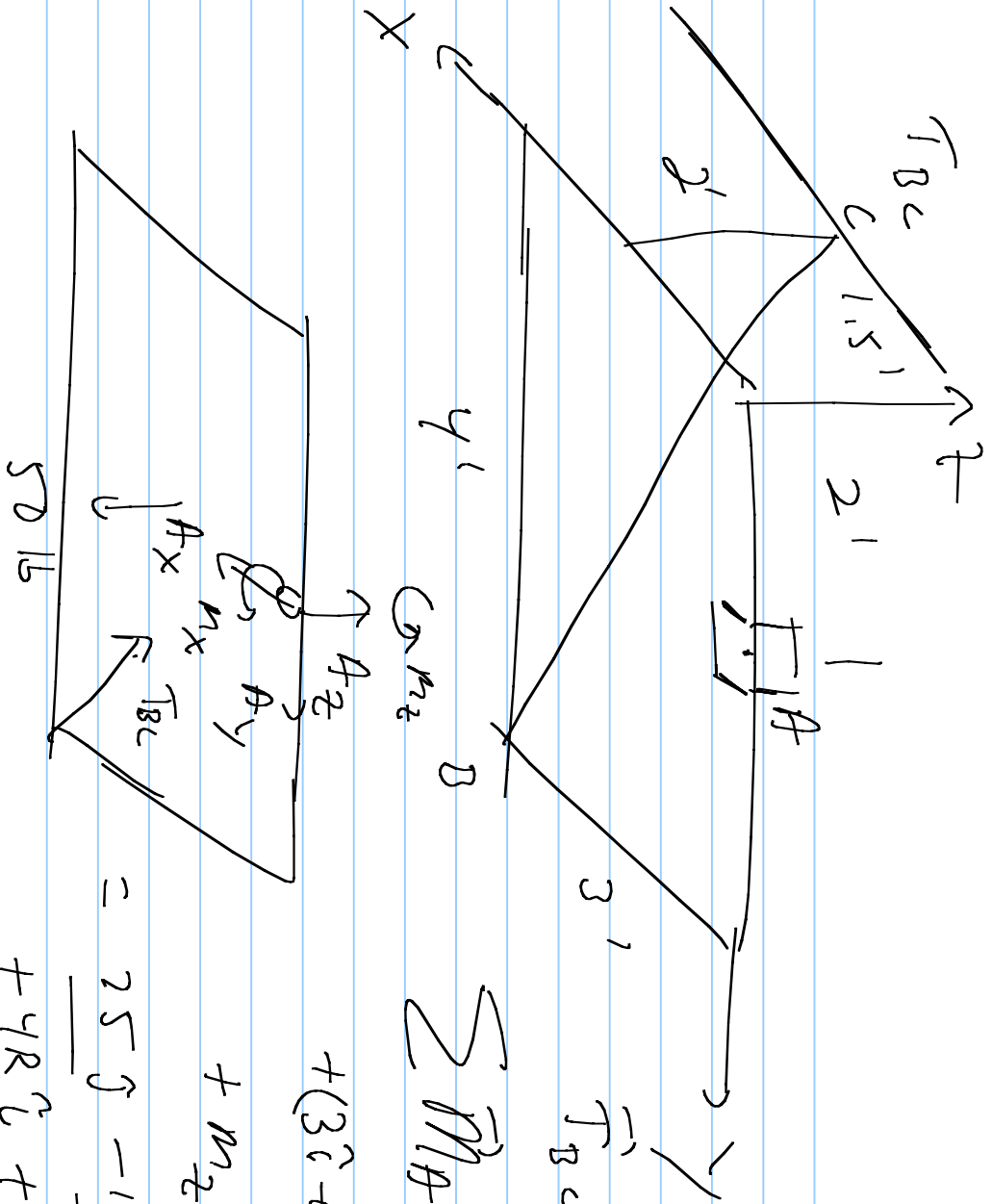
$$3A + 3B = 6850$$

$$3(-A + B = 250)$$

$$6B = 7600 \Rightarrow B = 1267 \text{ N}$$

$$A = B - 250 = 1017 \text{ N}$$

$$\sum F_z = A + B + C - 2500 = 0 \Rightarrow C = 217 \text{ N}$$



SO 16

$$\vec{T}_{BC} = 12(-1.5\hat{i} - 4\hat{j} + 2\hat{k})$$

$$\sum \vec{M}_A = 1.5\hat{i} \times (-50\hat{k})$$

$$+ (3\hat{i} + 2\hat{j}) \times \vec{T}_{BC} + B_x\hat{i}$$

$$+ m_z\hat{k} = 0$$

$$= 25\hat{j} - 12R\hat{k} - 6R\hat{j} + 3R\hat{k}$$

$$+ 4R\hat{i} + m_x\hat{i} + m_z\hat{k} = 0$$

$$\uparrow: 4R + M_x = 0 \Rightarrow M_x = -50 \text{ ft}\cdot\text{lbs}$$

$$\downarrow: 75 - 6R = 0 \Rightarrow R = 12.5 \text{ lbs}$$

$$\uparrow: -9R + M_z = 0 \quad M_z = 112.5 \text{ ft}\cdot\text{lbs}$$

$$\sum F_x = A_x - 1.5R = 0 \quad A_x = 18.75 \text{ lbs}$$

$$\sum F_y = A_y - 4R = 0 \quad A_y = 50 \text{ lbs}$$

$$\sum F_z = A_z - 50 + 2R = 0 \Rightarrow A_z = 25 \text{ lbs}$$

$$T_{RC} = 12.5 \left[1.5^2 + 4^2 + 2^2 \right]^{1/2} = 58.96 \text{ lbs}$$