

$$\vec{r}_{AD} = 1.5\hat{i} + 1\hat{k}$$

$$\vec{r}_{BD} = -2\hat{i} + 1\hat{k}$$

$$\vec{r}_{AC} = R_{AC}(1.5\hat{i} - 4\hat{j} + 1\hat{k})$$

$$\vec{r}_{BC} = R_{BC}(-2\hat{i} - 4\hat{j} + 1\hat{k})$$

$$\sum \vec{M}_D = \vec{r}_{AD} \times \vec{r}_{AC} + \vec{r}_{BD} \times \vec{r}_{BC} - 4\hat{j} \times 14.44\hat{k} = 0$$

$$\vec{r}_{AD} \times \vec{r}_{AC} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1.5 & 0 & 1 \\ 1.5 & -4 & 1 \end{vmatrix} \quad R_{AC} = R_{AC} \begin{bmatrix} \hat{i}(4) \\ -\hat{j}(0) \\ \hat{k}(-6) \end{bmatrix}$$

$$= R_{AC} [4\tilde{v} - 6k^2]$$

$$\rightarrow R_{BD} \times T_{BC} = \begin{array}{ccc|ccc} \tilde{v} & J & \tilde{v} & & & \\ -2 & 0 & 1 & R_{BC} & = & R_{BC} \\ -2 & -4 & 1 & & & \end{array} \left[\begin{array}{l} \tilde{v}(4) \\ -J(0) \\ \tilde{v}(8) \end{array} \right]$$

$$= R_{BC} [4\tilde{v} + 8k^2]$$

$$R_{AC} [\underline{4\tilde{v}} - 6k^2] + R_{BC} [4\tilde{v} + 8k^2] - 4,000,000 \tilde{v} = 0$$

$$\tilde{v}: 6R_{AC} = 8R_{BC} \Rightarrow R_{BC} = \frac{3}{4} R_{AC}$$

$$\tilde{v}: 4R_{AC} + 3R_{AC} = 4,000,000$$

$$R_{AC} = \frac{40,000}{7} \quad N \Rightarrow R_{BC} = \frac{36,000}{7} \quad N$$

$$\sum F_x = D_x + 1.5 \left(\frac{40,000}{7} \right) - 2 \left(\frac{36,000}{7} \right) = 0$$

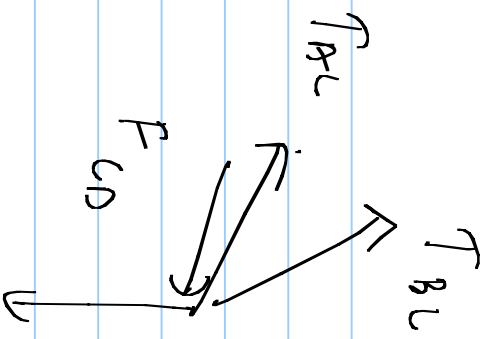
$$D_x = 0$$

$$\sum F_y = -D_y - 4 \left(\frac{40,000}{7} \right) - 4 \left(\frac{36,000}{7} \right) = 0$$

$$D_y = -\frac{288,000}{7} = -40,000 \quad N$$

$$\sum F_z = \frac{40,000}{7} + \frac{36,000}{7} + D_z - 40,000 = 0$$

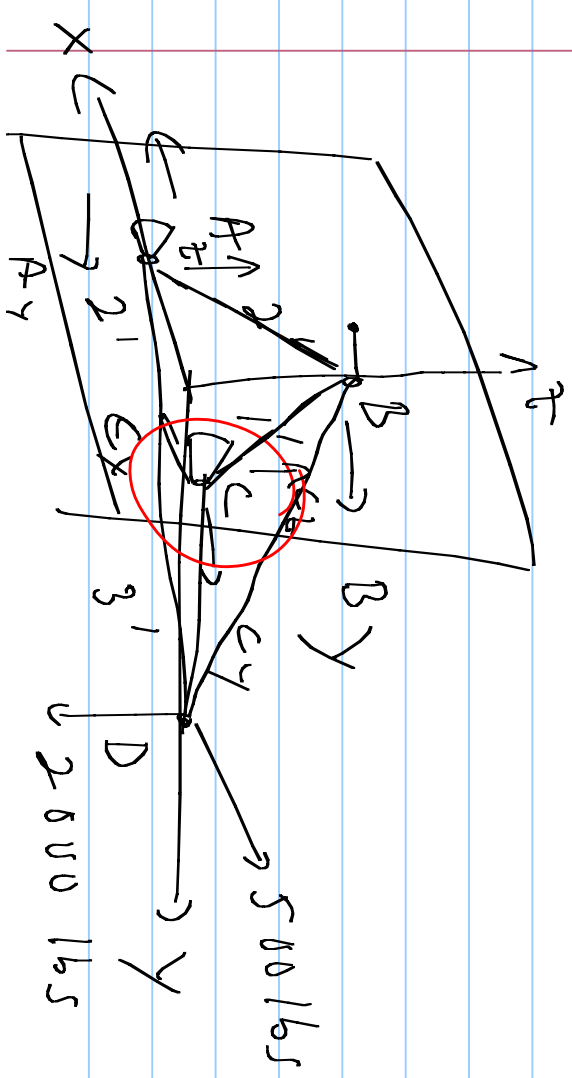
$$D_z = 30,000$$



40,000

$$\sum F_y = F_{CD} - \frac{4}{7}(40000) - \frac{4}{7}(30000) = 0$$

$$F_{CD} = 40,000 \text{ N}$$



$$\begin{aligned} \sum M_A &= (-2\hat{i} + 2\hat{k}) \times (By\hat{j}) \\ &\quad - 3\hat{j} \times (cy\hat{j} + cz\hat{k}) \\ &\quad (-2\hat{i} + 3\hat{j}) \times (-500\hat{i} - 2000\hat{k}) = 0 \end{aligned}$$

$$\begin{aligned} &= \frac{-2By}{\cancel{k}} \hat{k} - 2By\hat{j} - 3cy\hat{k} + 3cz\hat{j} \\ &\quad \frac{-4000y}{\cancel{j}} + \frac{1500k}{\cancel{k}} - \frac{6000\hat{j}}{\cancel{j}} = 0 \end{aligned}$$

$$i: -2By - 6000 = 0 \Rightarrow By = -3000 \text{ N}$$

$$j: 3cz - 4000 = 0 \Rightarrow cz = 4000/3 \text{ lbs}$$

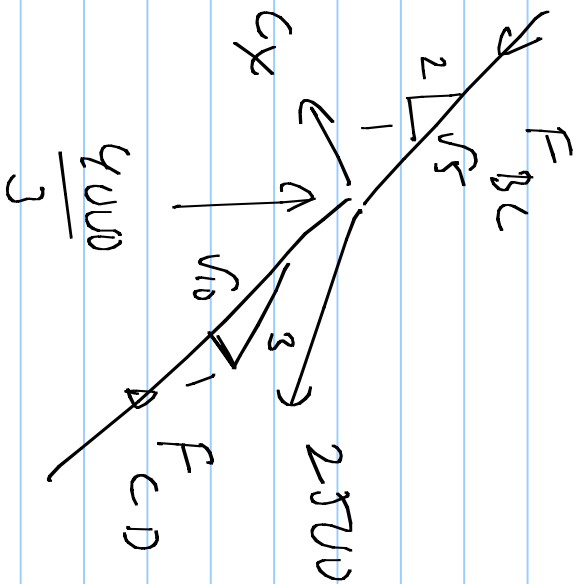
$$k: 6000 - 3cy + 1500 = 0 \Rightarrow cy = 2500 \text{ lbs}$$

$$\sum F_y = -\frac{2}{3} F_{CD} + 2500 = 0$$

$$F_{CD} = \frac{2500 \sqrt{3}}{3}$$

$$\sum F_x = \frac{4000}{3} - F_{BC} \frac{2}{\sqrt{3}} = 0$$

$$F_{BC} = \frac{2000 \sqrt{3}}{3}$$



$$\sum F_x = -\frac{1}{\sqrt{3}} (2500 \sqrt{3})$$

$$- \frac{1}{\sqrt{3}} (2000 \sqrt{3}) + C_x =$$

$$C_X = 1500 \text{ lbs}$$

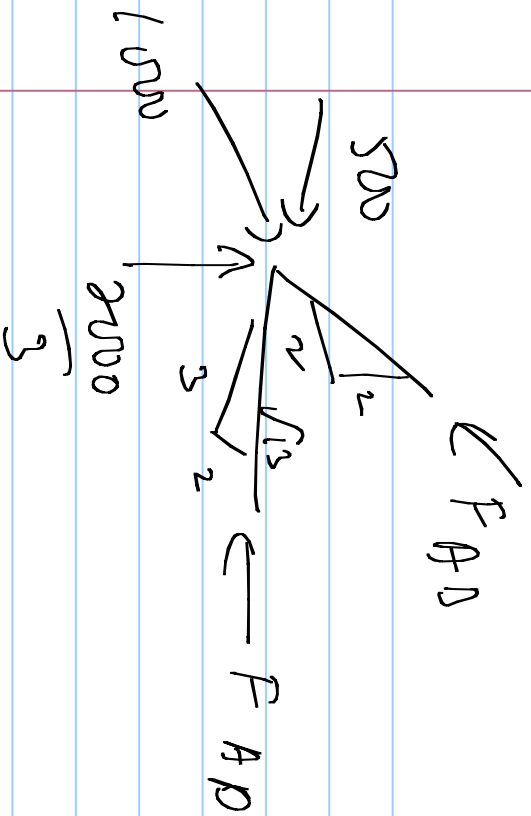
$$\sum F_z = A_z - 2000 + \frac{4000}{3} = 0$$

$$A_z = \frac{2000}{3} \text{ lbs}$$

$$\sum F_y = A_y + 2500 = 0 \Rightarrow A_y = -2500$$

$$\sum F_x = -500 + 1500 + A_x = 0$$

$$A_x = -1000 \text{ lbs}$$



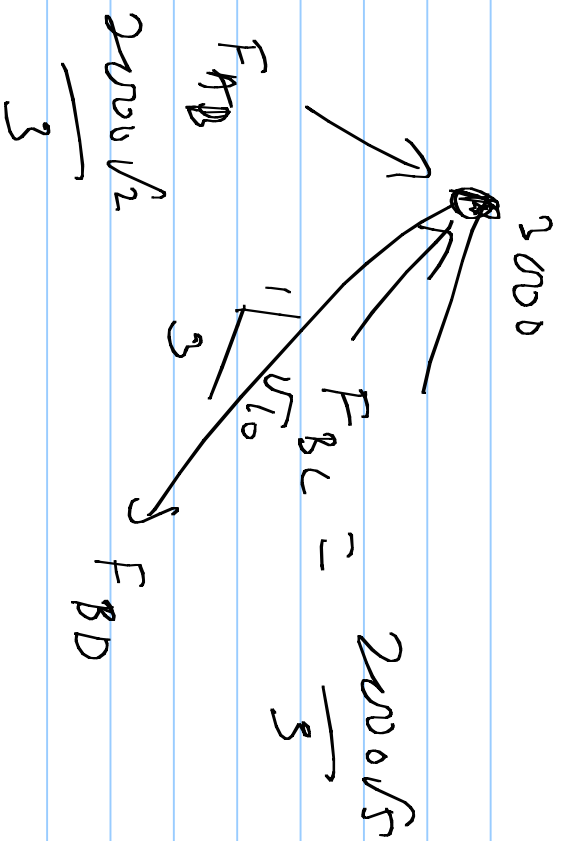
$$\sum F_y = 500 - \frac{2}{3} F_{AD} = 0$$

$$F_{AD} = \frac{500 \sqrt{13}}{3} \text{ lbs}$$

$$\sum F_x = -\frac{1}{\sqrt{2}} F_{AB} + \frac{2000}{3} = 0$$

$$F_{AB} = \frac{2000 \sqrt{2}}{3} \text{ lbs}$$

$$\begin{aligned} \sum F_x &= -1000 + \frac{1}{\sqrt{2}} \left(\frac{2000 \sqrt{2}}{3} \right) + \frac{2}{\sqrt{3}} \left(\frac{500 \sqrt{13}}{3} \right) = 0 \\ &= -1000 + \frac{2000}{3} + \frac{1000}{3} = 0 \end{aligned}$$



$$\sum F_y = -3000 + F_{BD} \left[\frac{3}{\sqrt{10}} \right] = 0$$

$$F_{BD} = 1000 \sqrt{10} \text{ lbs}$$