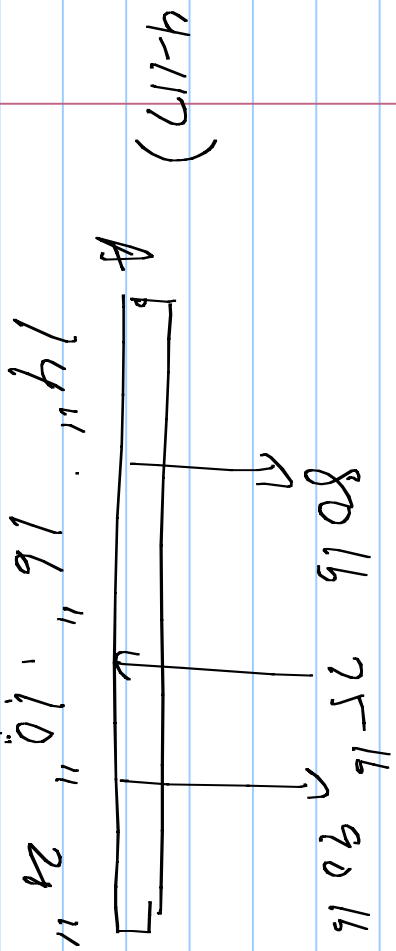


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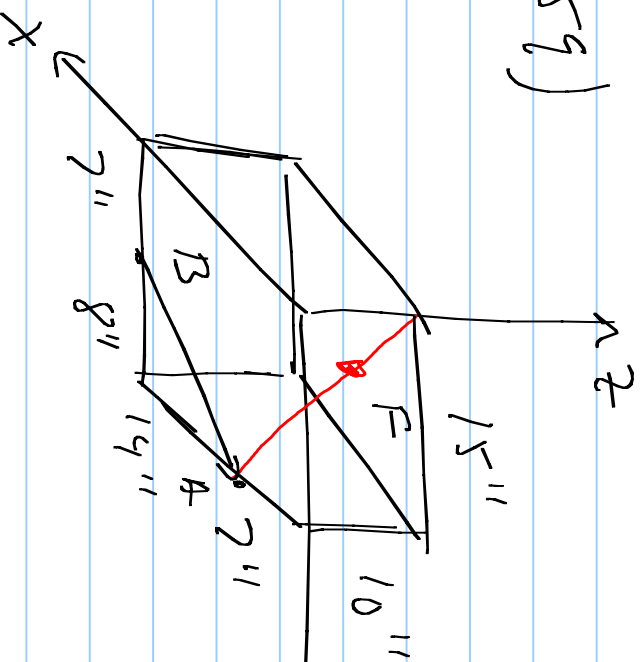
$$R = 80 + 90 = 170$$

$$M_A = 14 \cdot 80 - 30 \cdot 75 + 90 \cdot 8$$

$$= 2970 \text{ lb-ft}$$

$$x = \frac{M_A}{R} = 26.0 \text{ ft}$$

4-59)



$$F = 588 \text{ lbs}$$

$$\vec{F} = 588 [-7\hat{i} - 15\hat{j} + 10\hat{k}]$$

$$\sqrt{7^2 + 15^2 + 10^2} \text{ } \frac{1}{2}$$

$$\vec{r}_{AB} = -14\hat{i} + 8\hat{j}$$

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

\hat{i}	\hat{j}	\hat{k}	
-14	8	0	$\frac{588}{\sqrt{374}}$
-7	-15	10	

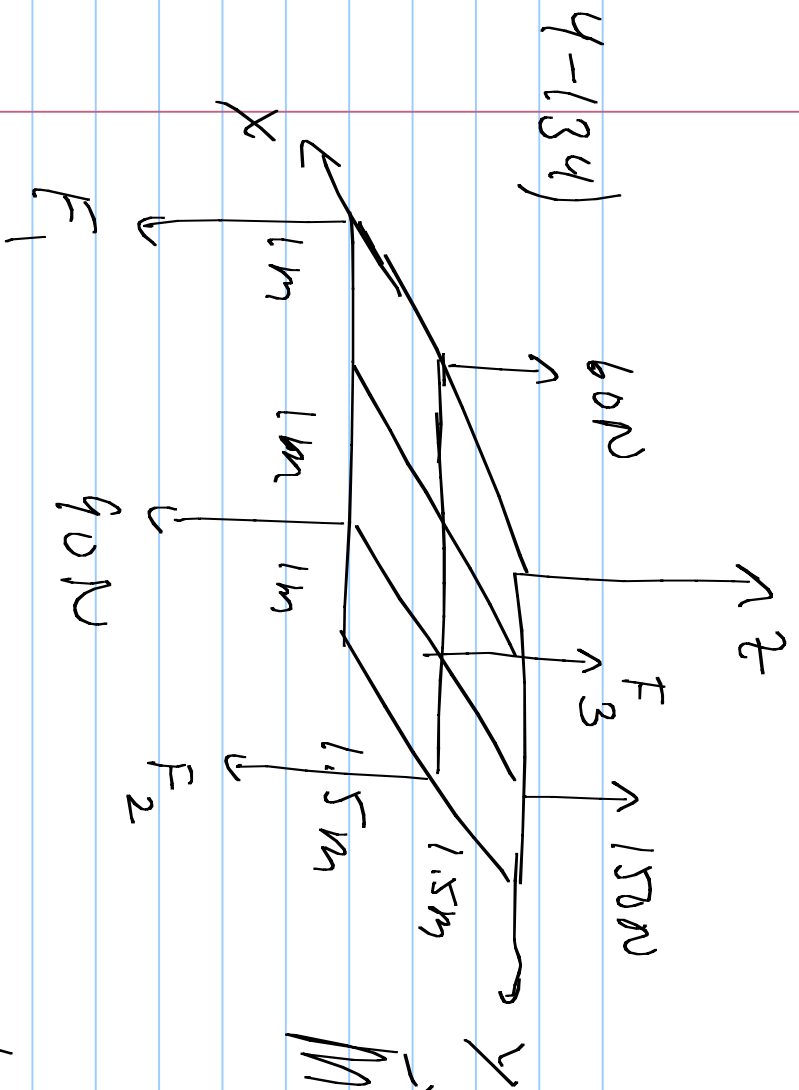
$$= \left[\hat{i} [80] - \hat{j} [-140] + \hat{k} (210 + 56) \right] \frac{580}{\sqrt{374}}$$

$$= 2399 \hat{i} + 4199 \hat{j} + 7978 \hat{k} \quad \text{in-lbs}$$

$$\theta_x = \cos^{-1} \left(\frac{2399}{9329} \right) = 75.1^\circ$$

$$\theta_y = \cos^{-1} \left(\frac{4199}{9329} \right) = 63.2^\circ$$

$$\theta_z = \cos^{-1} \left(\frac{7978}{9329} \right) = 31.2^\circ$$



$$R = 120 + F_3 - F_1 - F_2$$

$$\vec{M} = 1.5\vec{i} \times 60\vec{k} + 2\vec{j} \times 150\vec{k}$$

$$+ (3\vec{i} + 2\vec{j}) \times (-90\vec{k})$$

$$+ 3\vec{i} \times (-F_1\vec{k}) + (1.5\vec{i} + 3\vec{j}) \times (-F_2\vec{k})$$

$$+ (1.5\vec{i} + 2\vec{j}) \times F_3\vec{k}$$

$$= -90\vec{j} + 300\vec{i} + 270\vec{j} - 180\vec{i} + 3F_1\vec{j} + 1.5F_2\vec{j}$$

$$- 3F_2\vec{i} - 1.5F_3\vec{j} + 2F_3\vec{i}$$

$$z: 120 - 3F_2 + 2F_3 = -180$$

$$j: 180 + 3F_1 + 1.5F_2 - 1.5F_3 = 435$$

$$F_1 + F_2 - F_3 = 120$$

$$3F_2 - 2F_3 = 300 \quad F_2 = 160$$

$$3F_1 + 1.5F_2 - 1.5F_3 = 255 \quad F_3 = 90$$

$$-1.5(F_1 + F_2 - F_3 = 120)$$

$$1.5F_1 = 75 \Rightarrow F_1 = 50 \text{ N}$$

$$-2(F_2 - F_3 = 120)$$