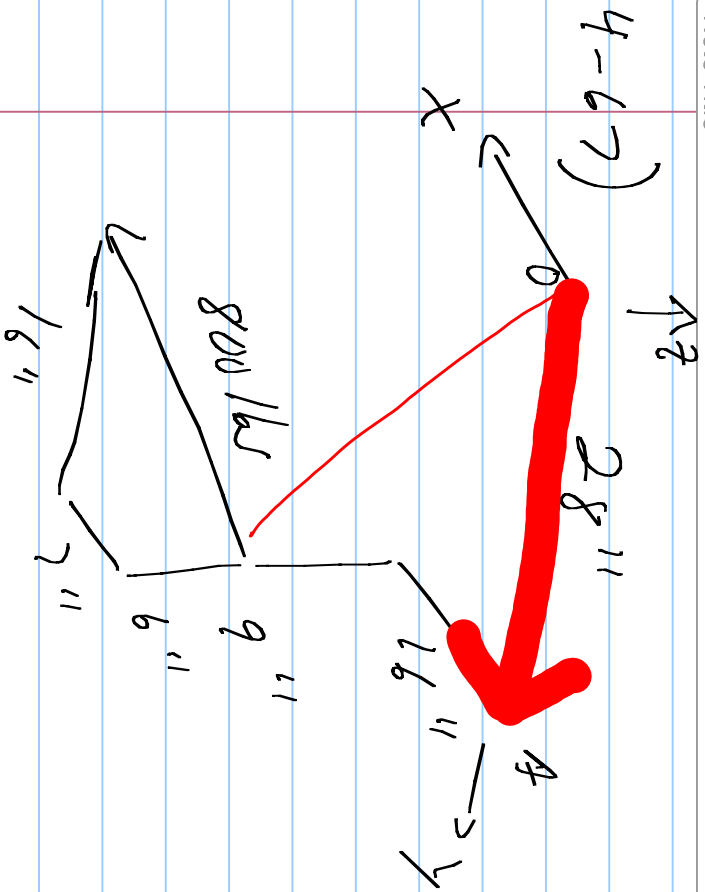


EGR 180

6/10/10



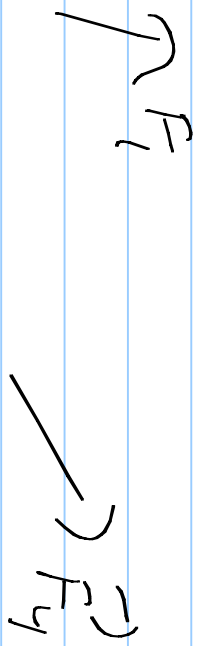
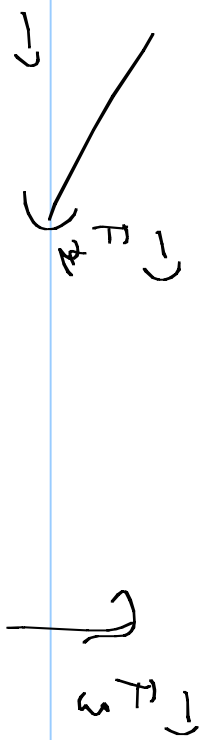
$$\vec{M}_D = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 16 & 28 & -9 \\ 7 & -16 & -6 \end{vmatrix} \frac{800}{\sqrt{341}}$$

$$= [0 \hat{i} (-312) - \hat{j} (-3) + \hat{k} (-452)]$$

800

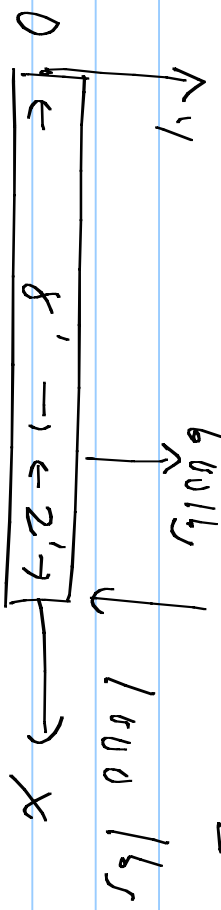
$$\vec{M}_D = -\frac{800}{\sqrt{341}} [312 \hat{i} - 3 \hat{j} + 452 \hat{k}]$$

$$M_{0A} = M_D \cdot \hat{j} = \frac{2400}{\sqrt{341}} = 130 \text{ in-lbs}$$



$$\vec{R} = \vec{F}_1 + \vec{F}_2 + \vec{F}_3 + \vec{F}_4$$

$$\vec{M}_O = r_1 \times \vec{F}_1 + r_2 \times \vec{F}_2 + r_3 \times \vec{F}_3 + r_4 \times \vec{F}_4$$



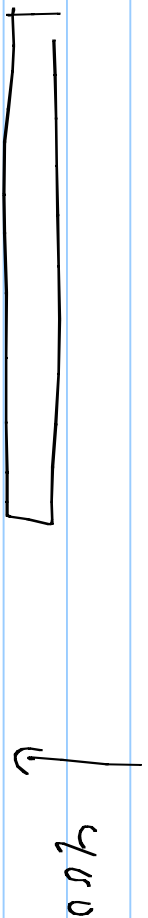
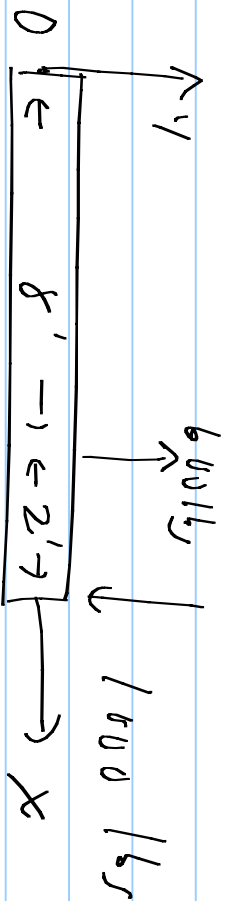
$$\vec{R} = 600\vec{j} - 1000\vec{j} = -400\vec{j}$$

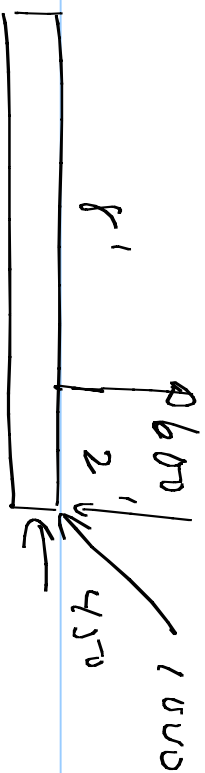
$$M = (8)(600) - 10(1000)$$

$$= 4800 - 10,000 = \underline{\underline{-5200}}$$



$$M = -400d = -5200 \Rightarrow d = 13'$$



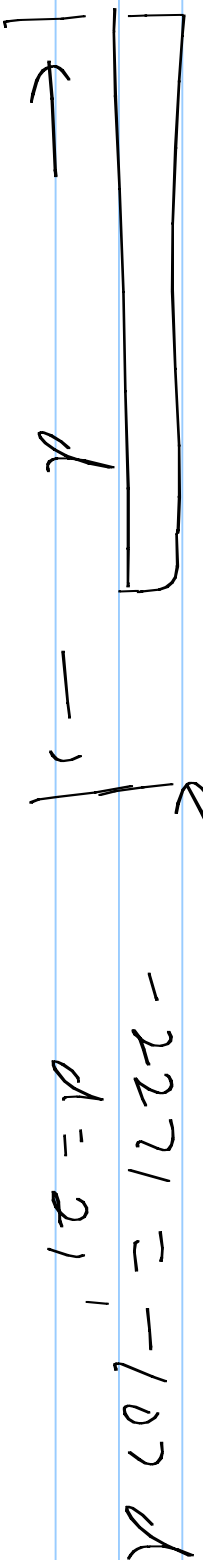


$$\vec{R} = +600\hat{j} - 500\sqrt{2}\hat{i} - 500\sqrt{2}\hat{j}$$

$$= -500\sqrt{2}\hat{i} + (600 - 500\sqrt{2})\hat{j}$$

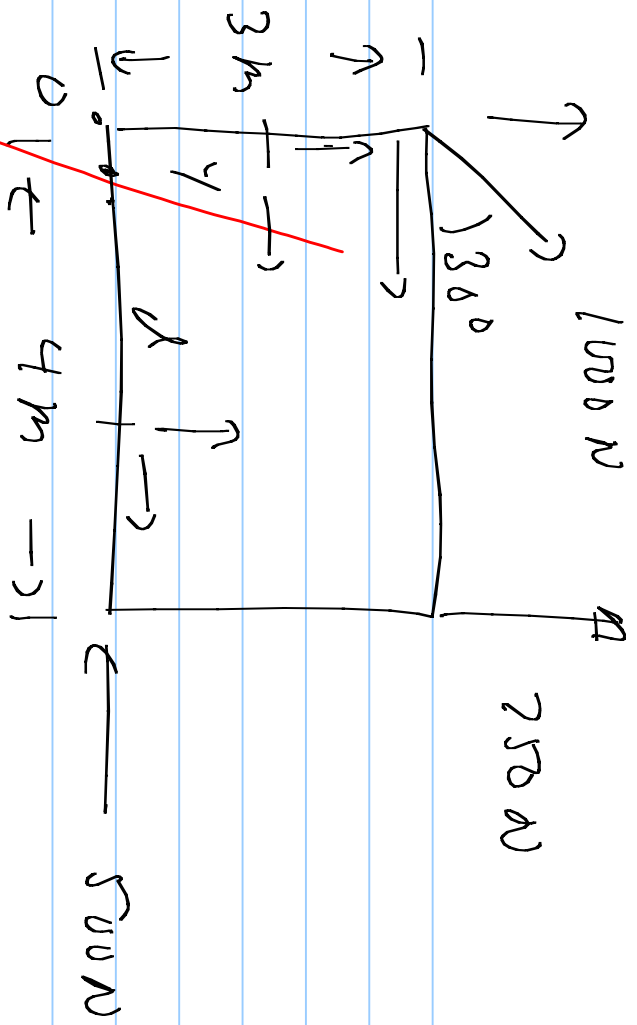
$$= -207\hat{i} - \underline{107}\hat{j}$$

$$M = (600)(r) - 10(500\sqrt{2}) = -2271 \text{ ft}\cdot\text{lbs}$$



$$-2271 = -107d$$

$$d = 21'$$



$$R = -500\hat{i} + 250\hat{j} + 500\sqrt{3}\hat{i} + 500\hat{j}$$

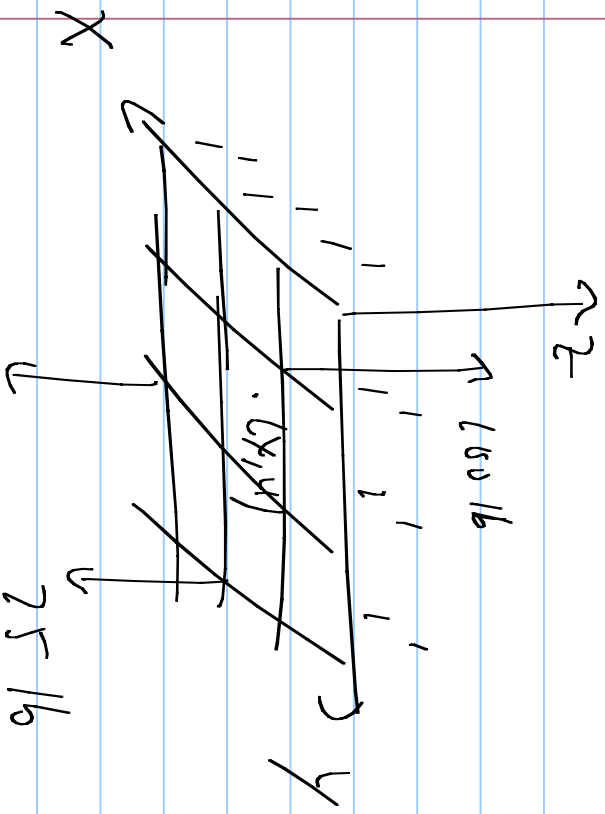
$$= 500(\sqrt{3}-1)\hat{i} + 1250\hat{j} \quad (N) = 366\hat{i} + 1250\hat{j}(N)$$

$$M = +(4)(250) - (3)(500\sqrt{3}) = 402 \text{ N}\cdot\text{m}$$

$$= 1250 \text{ d} \Rightarrow d = .82 \text{ m}$$

$$= -500(\sqrt{3}-1) \text{ y} \Rightarrow -1.10 \text{ m}$$

3D Parallel Force System



$$\vec{F} = 150\hat{k} - 200\hat{k} - 25\hat{k}$$

$$= -175\hat{k} \quad (150)$$

$$\vec{M} = (\hat{i} + \hat{j}) \times (150\hat{k})$$

$$+ (3\hat{i} + 2\hat{j}) \times (-200\hat{k})$$

$$+ (2\hat{i} + 3\hat{j}) \times (-25\hat{k})$$

$$= -100\hat{j} + 100\hat{i}$$

$$\vec{M} = (x\hat{i} + y\hat{j}) \times (-175\hat{k})$$

$$600\hat{j} - 400\hat{i}$$

$$= 175x\hat{j} - 175y\hat{i}$$

$$= \underline{150\hat{j}} - \underline{225\hat{i}}$$

$$= \underline{-525\hat{i}} + \underline{650\hat{j}}$$

$$125y = 525$$

$$125x = 650$$

$$y = 3,00 \text{ ft}$$

$$x = 3,71 \text{ ft}$$