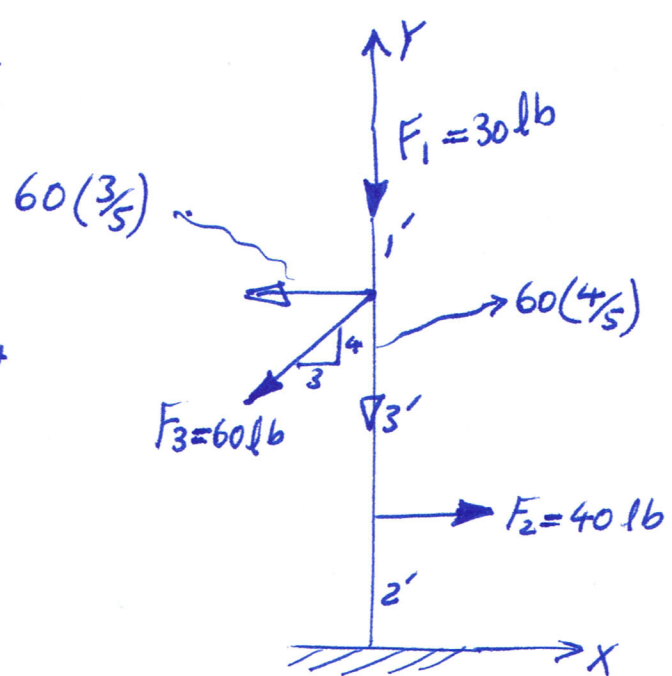


Problem 4-105

Replace the loading system acting on the post by an equivalent resultant force & couple moment at point P.



$$\vec{F}_R = \sum \vec{F}$$

$$\vec{F}_R = 40\hat{i} - 30\hat{j} - 60\left(\frac{3}{5}\right)\hat{i} - 60\left(\frac{4}{5}\right)\hat{j} = 40\hat{i} - 30\hat{j} - 36\hat{i} - 48\hat{j}$$

$$\vec{F}_R = 4\hat{i} - 78\hat{j} \text{ lb}$$

$$|\vec{F}_R| = \sqrt{4^2 + 78^2} = 78.1 \text{ lb}$$

$$M_P = F_1 \cdot d_1 + F_2 \cdot d_2 + F_3 \cdot d_3$$

$$M_P = 0 + (40)(4) + \ominus 60\left(\frac{3}{5}\right)(1) = 140 - 36 = 124 \text{ lb}\cdot\text{ft}$$

F_1 and vertical component of F_3 do not create any moments about P. (They pass through P)

$$\boxed{|M_P| = 124 \text{ lb}\cdot\text{ft}} \rightarrow \boxed{\vec{M}_P = +124\hat{k}} \text{ lb}\cdot\text{ft}$$

correct