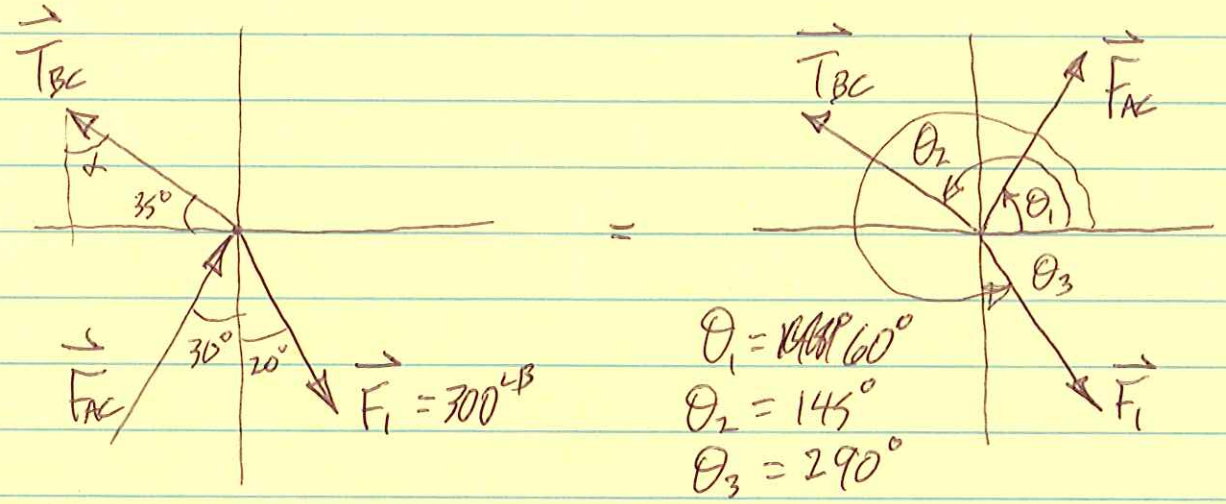
PROB. 2.46

$\alpha = 55°$, FIND $\vec{F}_{AC}$, $\vec{T}_{BC}$



DEFINE VECTORS:

$$\vec{T}_{BC} = (T_{BC} \cdot \cos 145°)\,\hat{i} + (T_{BC} \cdot \sin 145°)\,\hat{j}$$

$$\vec{T}_{BC} = (-0.819\,T_{BC})\,\hat{i} + (0.573\,T_{BC})\,\hat{j}^{LB}$$

$$\vec{F}_{AC} = (F_{AC} \cos 60°)\,\hat{i} + (F_{AC} \cdot \sin 60°)\,\hat{j}$$

$$\vec{F}_{AC} = (0.5\,F_{AC})\,\hat{i} + (0.866\,F_{AC})\,\hat{j}^{LB}$$

$$\vec{F}_1 = (300 \cdot \cos 290°)\,\hat{i} + (300 \cdot \sin 290°)\,\hat{j}$$

$$\vec{F}_1 = (102.6)\,\hat{i} + (-281.9)\,\hat{j}^{LB}$$

EQUILIBRIUM EQUATIONS:

$$\Sigma F_x = 0, \quad \Sigma F_y = 0$$

$\Sigma F_x = 0$: $-0.819\,T_{BC} + 0.5\,F_{AC} + 102.6 = 0$

$T_{BC} = 0.610\,F_{AC} + 125.3$

$\Sigma F_y = 0$: $0.573\,T_{BC} + 0.866\,F_{AC} - 281.9 = 0$

$0.573\,(0.610\,F_{AC} + 125.3) + 0.866\,F_{AC} = 281.9$

$1.215\,F_{AC} + 71.8 = 281.9$

$F_{AC} = 172.9^{LB}$

$T_{BC} = 0.610 \cdot (172.9) + 125.3 = 230.8^{LB}$