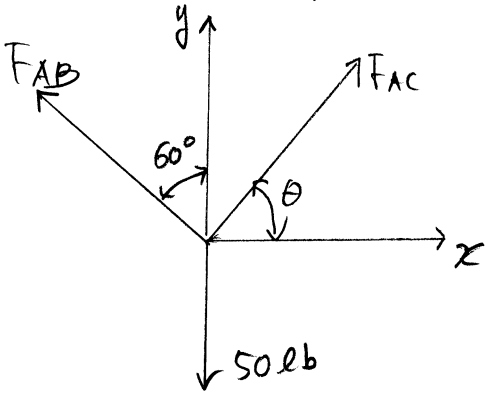
12-331 Solid Mechanics

HW #1 Due: 9/5/00

1-39



$\Sigma F_x = 0$; $F_{AB} \cdot \sin 60 - F_{AC} \cdot \cos\theta = 0$

$\Sigma F_y = 0$; $F_{AB} \cdot \cos 60 + F_{AC} \cdot \sin\theta = 50$

$\sigma_{AC} = 2 \cdot \sigma_{AB}$

$$\frac{F_{AC}}{\frac{\pi}{4}(0.4^2)} = 2\,\frac{F_{AB}}{\frac{\pi}{4}(0.5^2)} \; ; \; F_{AC} = 1.28 F_{AB}$$

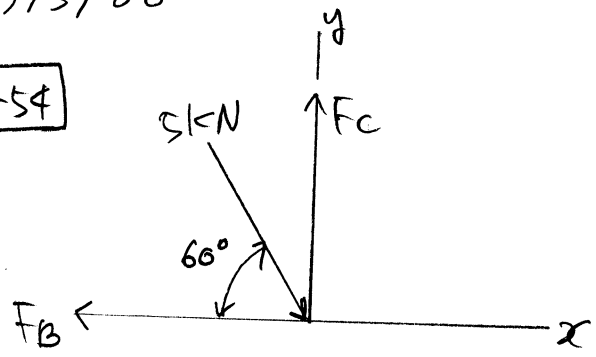
$\underline{\theta = 41.4^\circ}$

$F_{AB} = 34.66\ (lb)$ $F_{AC} = 44.37\ (lb)$

$$\sigma_{AC} = \frac{F_{AC}}{\frac{\pi}{4}(0.4^2)} = \underline{353\ (psi)}$$

$$\sigma_{AB} = \frac{F_{AB}}{\frac{\pi}{4}(0.5^2)} = \underline{111\ (psi)}$$

1-54



$\Sigma F_x = 0$; $5 \cdot \cos 60 - F_B = 0$

$\underline{F_B = 2.50\ kN}$

$\Sigma F_y = 0$; $F_C - 5 \cdot \sin 60 = 0$

$\underline{F_C = 4.330\ kN}$

$$\sigma_B = \frac{F_B}{A_B} = \frac{2.5 \times 10^3}{(0.04)(0.03)} = \underline{2.08\ MPa}$$

$$\sigma_C = \frac{F_C}{A_C} = \frac{4.33 \times 10^3}{\frac{\pi}{4}(0.01^2)} = \underline{55.13\ MPa}$$