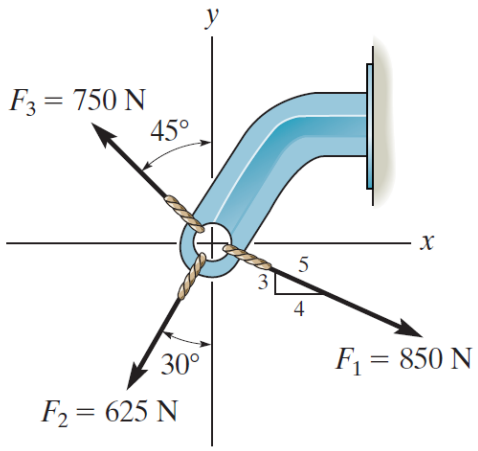
Problem 2-42

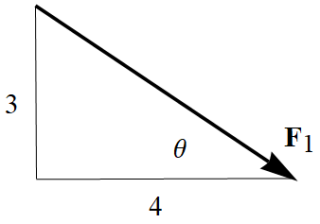
Determine the magnitude of the resultant force and its direction, measured counterclockwise from the positive x axis.



Probs. 2–42/43

Solution

Begin by finding the angle $\mathbf{F}_1$ makes with the horizontal.



$$\tan\theta = \frac{3}{4} \quad \rightarrow \quad \theta = \tan^{-1}\left(\frac{3}{4}\right) \approx 36.9^\circ$$

Write each of the forces in component form.

$$\mathbf{F}_1 = 850\,\langle \cos\theta, -\sin\theta \rangle \text{ N} = 850\left\langle \frac{4}{5}, -\frac{3}{5} \right\rangle \text{ N} = \langle 680, -510 \rangle \text{ N}$$

$$\mathbf{F}_2 = 625\,\langle -\sin 30^\circ, -\cos 30^\circ \rangle \text{ N} \approx \langle -313, -541 \rangle \text{ N}$$

$$\mathbf{F}_3 = 750\,\langle -\sin 45^\circ, \cos 45^\circ \rangle \text{ N} \approx \langle -530, 530 \rangle \text{ N}$$