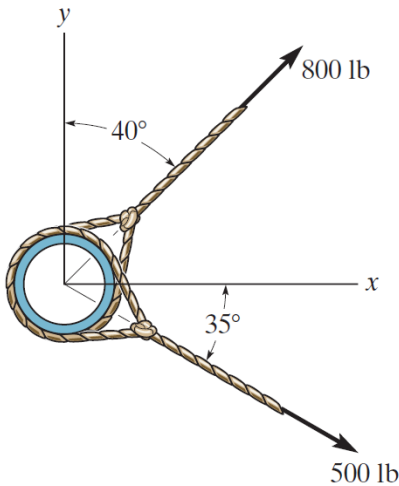


## Problem 2-10

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



**Prob. 2-10**

### Solution

Write each of the forces in component form.

$$\mathbf{F}_1 = 800\langle \sin 40^\circ, \cos 40^\circ \rangle \text{ lb}$$

$$\mathbf{F}_2 = 500\langle \cos 35^\circ, -\sin 35^\circ \rangle \text{ lb}$$

Add these vectors together to get the resultant.

$$\begin{aligned} \mathbf{F}_R &= \mathbf{F}_1 + \mathbf{F}_2 \\ &= \langle 800 \sin 40^\circ + 500 \cos 35^\circ, 800 \cos 40^\circ - 500 \sin 35^\circ \rangle \text{ lb} \\ &\approx \langle 924, 326 \rangle \text{ lb} \end{aligned}$$

Its magnitude is

$$|\mathbf{F}_R| = \sqrt{(800 \sin 40^\circ + 500 \cos 35^\circ)^2 + (800 \cos 40^\circ - 500 \sin 35^\circ)^2} \text{ lb} \approx 980. \text{ lb},$$

and the direction it points in counterclockwise from the positive  $x$ -axis is

$$\tan \phi = \frac{800 \cos 40^\circ - 500 \sin 35^\circ}{800 \sin 40^\circ + 500 \cos 35^\circ} \rightarrow \phi \approx 19.4^\circ.$$