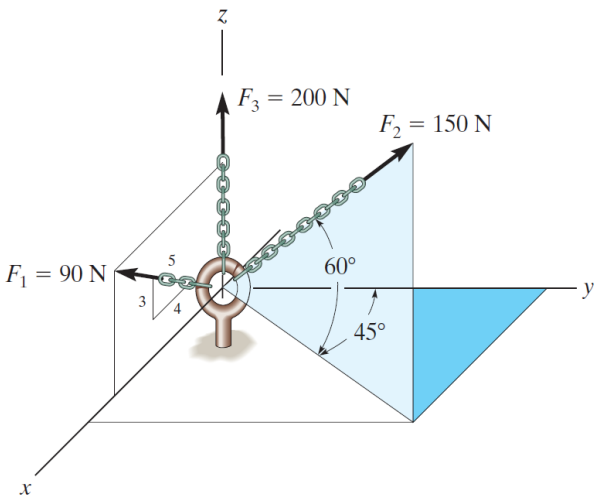
Problem 2-73

Express each force in Cartesian vector form.



Probs. 2–73/74

Solution

Let θ be the angle that $\mathbf{F}_1$ makes with the x-axis.

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

Write each of the forces in component form.

$$\mathbf{F}_1 = 90\,\langle \cos\theta, 0, \sin\theta \rangle \text{ N} = 90\left\langle \frac{4}{5}, 0, \frac{3}{5} \right\rangle \text{ N} = \langle 72, 0, 54 \rangle \text{ N}$$

$$\mathbf{F}_2 = 150\,\langle \cos 60^\circ \sin 45^\circ, \cos 60^\circ \cos 45^\circ, \sin 60^\circ \rangle \text{ N} \approx \langle 53.0, 53.0, 130 \rangle \text{ N}$$

$$\mathbf{F}_3 = 200\,\langle 0, 0, 1 \rangle \text{ N} = \langle 0, 0, 200 \rangle \text{ N}$$