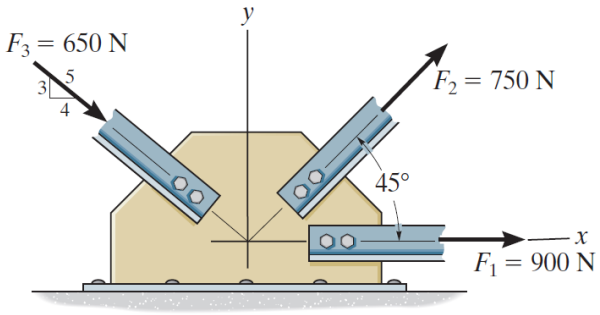
Problem 2-36

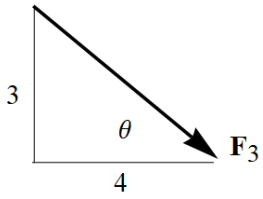
Resolve each force acting on the *gusset plate* into its x and y components, and express each force as a Cartesian vector.



Probs. 2–36/37

Solution

Begin by finding the angle θ that $\mathbf{F}_3$ 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.

$$\mathbf{F}_1 = 900\,\langle 1, 0\rangle \text{ N} = \langle 900, 0\rangle \text{ N}$$

$$\mathbf{F}_2 = 750\,\langle \cos 45^\circ, \sin 45^\circ\rangle \text{ N} \approx \langle 530, 530\rangle \text{ N}$$

$$\mathbf{F}_3 = 650\,\langle \cos\theta, -\sin\theta\rangle \text{ N} = 650\left\langle \frac{4}{5}, -\frac{3}{5}\right\rangle \text{ N} = \langle 520, -390\rangle \text{ N}$$