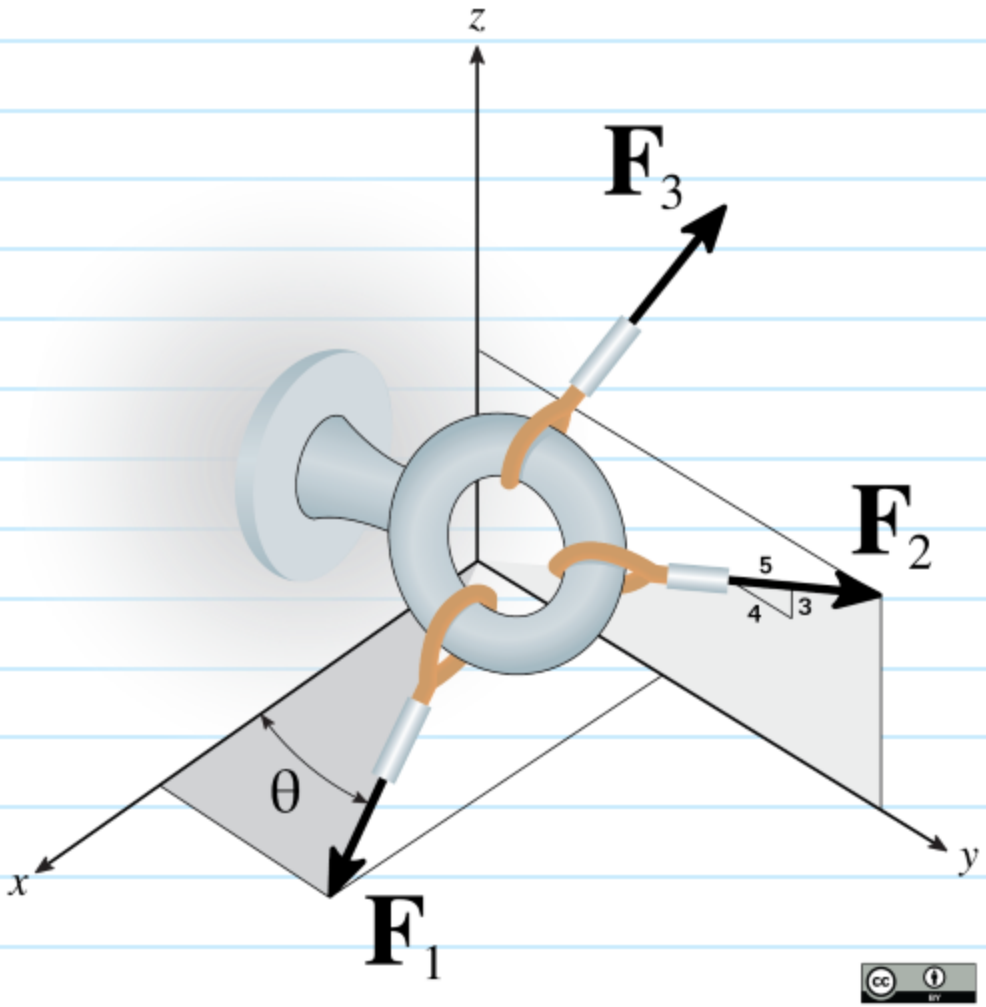
21-5-2-8-GD-001



UBC Engineering

The forces F_1 & F_2 are acting on a metal loop. A third force F_3 counteracts F_1's & F_2's resultant force (F_R). If $F_1 = F_1$ N, $F_2 = F_2$ N, and $\theta = \theta$ degrees, what are the cartesian vector components of $\vec{F}_R$? What is the magnitude of F_3?

given F_1, F_2, θ

find $\vec{F}_R, F_3$

Cartesian Vector Form

$$\vec{F}_1 = F_1 \cos\theta \uparrow + F_1 \sin\theta \rightarrow + 0\,\hat{k}$$

$$\vec{F}_2 = 0 \uparrow + F_2 \tfrac{4}{5} \rightarrow + F_2 \tfrac{3}{5}\,\hat{k}$$

$$\vec{F}_R = F_1 \cos\theta \uparrow + \left[F_1 \sin\theta + F_2 \tfrac{4}{5}\right] \rightarrow + F_2 \tfrac{3}{5}\,\hat{k}$$

$$F_3 = |\vec{F}_R| = \sqrt{\left[F_1 \cos\theta\right]^2 + \left[F_1 \sin\theta + F_2 \tfrac{4}{5}\right]^2 + \left[F_2 \tfrac{3}{5}\right]^2}$$