§3.3 #35

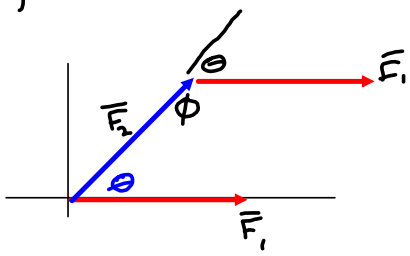
Given

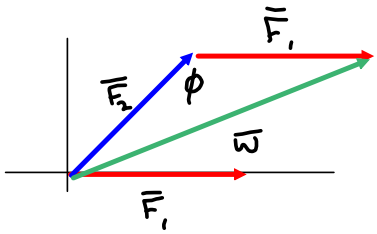
$\bar{F}_1 + \bar{F}_2 = \bar{w}$

$\|F_1\| = 70$, $\|\bar{F}_2\| = 40$, $\|\bar{w}\| = 95$

Find the angle θ between $\bar{F}_1$ & $\bar{F}_2$.

This is more elegant than my original work.





$\phi = \pi - \theta$ or $180^\circ - \theta$; in degrees

$$\cos\phi = \frac{\|\bar{F}_1\|^2 + \|\bar{F}_2\|^2 - \|\bar{w}\|^2}{2\|\bar{F}_1\|\|\bar{F}_2\|}$$

$$= \frac{40^2 + 70^2 - 95^2}{2(40)(70)} = \frac{1600 + 4900 - 9025}{5600}$$

$$= \frac{6500 - 9025}{5600} = -0.4508928571$$

$$\Rightarrow \phi \approx \cos^{-1}(-0.4508928571) \approx 116.8009832^\circ$$

$$\Rightarrow \theta = 180^\circ - \phi \approx 63.19901682^\circ$$

95
95
1475
9025
8725

When they said make the first vector lie along the positive x-axis, I thought that was to make it easier to do it the way I first saw how to do it.

But really, it doesn't matter at all, using this method, how the first vector is oriented. You'll get the same angle between F1 and F2.