Vectors

1 Problem I

A vector $\vec{\mathbf{F}}$ has a magnitude of 2 and makes an angle of 30° with the x–axis (with positive rotation counterclockwise).

1. Draw $\vec{\mathbf{F}}$.
2. Write $\vec{\mathbf{F}}$ in the form $F_x\hat{\boldsymbol{\imath}} + F_y\hat{\boldsymbol{\jmath}}$.

Answer

2. $\vec{\mathbf{F}} = 2\cos(30^\circ)\hat{\boldsymbol{\imath}} + 2\sin(30^\circ)\hat{\boldsymbol{\jmath}} = \sqrt{3}\hat{\boldsymbol{\imath}} + \hat{\boldsymbol{\jmath}}$, where $\cos(30^\circ) = \sqrt{3}/2$ and $\sin(30^\circ) = 1/2$ was used in the last step.

2 Problem II

Given $\vec{\mathbf{F}} = 3\hat{\boldsymbol{\imath}} - 4\hat{\boldsymbol{\jmath}}$, find

1. Draw $\vec{\mathbf{F}}$.
2. Compute F.
3. The angle $\vec{\mathbf{F}}$ makes with respect to the x–axis (with positive rotation counterclockwise).

2. $F = \sqrt{3^2 + 4^2} = 5$
3. $\theta = 360^\circ - \tan^{-1}(4/3) \simeq 307^\circ$