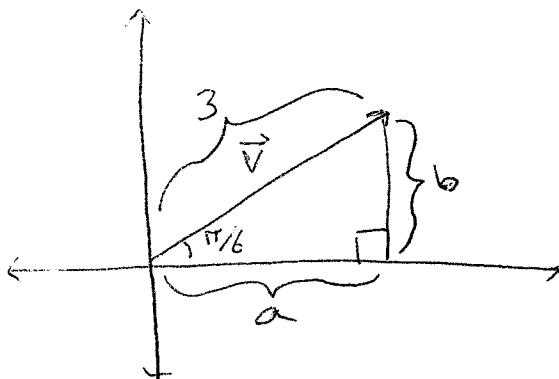


### Solutions for Quiz 1, Section A03

Find a vector in the plane of length 3 that makes an angle of  $\frac{\pi}{6}$  with the  $x$ -axis.

*Solution:* Let  $\vec{v}$  be a vector in the plane of length 3 that makes an angle of  $\frac{\pi}{6}$  with the  $x$ -axis. We can draw a right triangle, as below, where  $v$  is the hypotenuse.



The  $x$ -coordinate of  $\vec{v}$  is  $a$  and the  $y$ -coordinate of  $\vec{v}$  is  $b$ . So we have:

$$\begin{aligned}\cos\left(\frac{\pi}{6}\right) &= \frac{a}{3} \\ \frac{\sqrt{3}}{2} &= \frac{a}{3} \\ \frac{3\sqrt{3}}{2} &= a\end{aligned}$$

And:

$$\begin{aligned}\sin\left(\frac{\pi}{6}\right) &= \frac{b}{3} \\ \frac{1}{2} &= \frac{b}{3} \\ \frac{3}{2} &= b\end{aligned}$$

So  $\vec{v} = \left(\frac{3\sqrt{3}}{2}, \frac{3}{2}\right)$ .