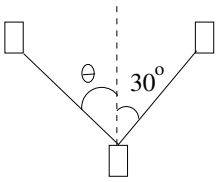
Appendix J.1: Additional Problems

1. Given the points $P(2,-5)$ and $Q(6,5)$ find a vector of length 3 that is in the same direction as $\overrightarrow{QP}$.

2. Two tug boats are towing a large ship into port. The larger tug exerts a force of 5000 pounds on its cable, and the smaller tug exerts a force of 3500 pounds on its cable. If the ship is to travel in a straight line, find the angle θ that the larger tug must make if the smaller tug makes an angle of 30^o.



3. A pilot wants to fly from town A to town B which is due North of town A. There is a wind blowing from the direction S30^{o}W at a speed of 30km/hr. The airspeed of the plane is 250km/hr.
   A) What direction should the plane fly?
   B) What is the ground speed of the plane?

4. Suppose you have three vectors $\mathbf{a} = \langle 6, 10\rangle$, $\mathbf{b} = \langle 3, 4\rangle$, and $\mathbf{c} = \langle 15, 27\rangle$. Find constants(scalars) d and m so that $\mathbf{c} = d\mathbf{a} + m\mathbf{b}$.

5. The vector $\mathbf{a}$ is shown in the figure to the right. Which of the following represents $\mathbf{a}$?

   (a) $\langle -10\sin(50), 10\cos(50)\rangle$

   (b) $\langle -10\cos(50), 10\sin(50)\rangle$

   (c) $\langle 10\cos(40), 10\sin(40)\rangle$

   (d) $\langle 10\sin(50), 10\cos(50)\rangle$

   (e) $\langle -\cos(40), \sin(40)\rangle$