Homework 1.2

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1.
   - Magnitude: $\sqrt{3^2+4^2} = 5$ feet per second
   - Direction: $\frac{1}{5}\langle 3,4\rangle = \langle \frac{3}{5}, \frac{4}{5}\rangle$

3.
   - Magnitude: $\sqrt{(-6)^2+(1)^2+(6)^2} = \sqrt{73}$ meters per second
   - Direction: $\frac{1}{\sqrt{73}}\langle -6,1,6\rangle = \langle \frac{-6}{\sqrt{73}}, \frac{1}{\sqrt{73}}, \frac{6}{\sqrt{73}}\rangle$

5.
   - Magnitude: $\sqrt{(1)^2+(-1)^2+(1)^2+(-1)^2} = 2$
   - Direction: $\frac{1}{2}\langle 1,-1,1,-1\rangle = \langle \frac{1}{2}, -\frac{1}{2}, \frac{1}{2}, -\frac{1}{2}\rangle$

7.
   - Magnitude: $\sqrt{(2)^2+(-3)^2+(1)^2} = \sqrt{14}$
   - Direction: $\frac{1}{14}(2\mathbf{i}-3\mathbf{j}+\mathbf{k}) = \frac{2}{14}\mathbf{i} - \frac{3}{14}\mathbf{j} + \frac{1}{14}\mathbf{k}$

9.

10.

13. $1\left(-\frac{1}{2}\right) + 2(-1) = -2.5 \Rightarrow \frac{-2.5}{(\sqrt{5})}\left(\frac{\sqrt{5}}{2}\right) = -1 \Rightarrow \cos^{-1}(-1) = 0$, thus the angle between them is zero. Because one of the vectors is negative and one is positive, they are in opposite directions.

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