Homework 7

Math 112

Due March 12th at the start of class

Textbook Exercises

4.1: 4.1.4B, 4.1.5B, 4.1.6B, 4.1.7B

4.2: 4.2.1B, 4.2.2B, 4.2.3B, 4.2.5B, 4.2.7B, 4.2.11B

4.3: 4.3.1B, 4.3.3B, 4.3.5B, 4.3.8B, 4.3.10B, 4.3.12B, 4.3.15B

Whenever the book uses the word perpendicular, treat it as through they'd used orthogonal.

Exercise 1: Let $\vec{v}$ be the vector from $(-1, -1)$ to $(1, 5)$ and $\vec{w}$ the vector from $(0, 0)$ to $(-3, 0)$.

   a) Find a unit vector decomposition for $\vec{v}$ and $\vec{w}$.

   b) Find $\vec{v} + \vec{w}$ and draw all three vectors.

   c) Find $\|\vec{v}\|$, $\|\vec{w}\|$, and $\|\vec{v} + \vec{w}\|$.

   d) Find $\vec{v} \bullet \vec{w}$.

   e) What is the angle between $\vec{v}$ and $\vec{w}$?

Exercise 2: We can talk about vectors in higher dimensions — let's have a brief look at 3-dimensional ones.

a) Let $\vec{k}$ be the unit vector that points in the positive z-direction (so if you draw an xy-plane, it points straight up out of the origin). Let $\vec{v}$ be the vector from $(1, 2, 3)$ to $(4, 4, 4)$. Find the unit vector decomposition of $\vec{v}$ in terms of $\vec{i}$, $\vec{j}$, and $\vec{k}$.

b) There's a 3-dimensional form of the formula to find magnitude: $\|a\vec{i} + b\vec{j} + c\vec{k}\| = a^2 + b^2 + c^2$. Use it to find $\|\vec{v}\|$.

c) Let $\vec{w} = \vec{i} + \vec{j} + \vec{k}$ It's not quite as clear what we mean when we say the *angle between $\vec{v}$ and $\vec{w}$* as it is for 2-dimensional vectors, but we can still use the dot product formula. Find that angle.