# Homework 7

Math 112

Due December 1st at 11:59 PM

**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.