MATH-332: Linear Algebra Chapter: 6

Orthogonality and Least Squares

Section 6.1: Inner Product, Length, & Orthogonality

pgs. 375 - 384 *July 27, 2009*

	Lecture: Inner Product, Length, & Orthogonality
Topics:	Inner Product Norm Orthogonality Orthogonal Complements
Problems	Prac: 1-4 Prob: 15, 17, 19, 20, 24, 29, 30, 31

Section Goals

- Understand how the definition of an inner-product on vectors from $\mathbb{R}^n$ corresponds to an abstraction of dot-product/angle and how this can be used to generate a norm which endows a vector space with the geometric concepts, length and distance.
- Relate the classical vector spaces, associated with a matrix, to each other by the concept of orthogonality and the orthogonal compliment.

Section Objectives

- Define inner-product, norm and distance for vectors from $\mathbb{R}^n$ and their associated properties.
- Define orthogonality between vectors and prove the Pythagorean theorem in $\mathbb{R}^n$.
- Define the orthogonal compliment of a vector space and justify theorem 6.1.3 on page 381, which characterizes the orthogonal compliment by relations between the classical matrix spaces.