MATH-332: Linear Algebra <u>Chapter</u>: 5

<u>Eigenvalues and Eigenvectors</u>

<u>Section</u> 5.1: Eigenvectors, Eigenvalues

pgs. 302 - 308 *July 21, 2009*

<u>Lecture:</u> Eigenvectors, Eigenvalues

Topics:	Eigenvectors Eigenspaces Eigenvalues Linear Independence of Eigenvectors
Problems	Prac: 1, 2 Prob: 5, 7, 15, 19, 21, 22, 25, 27

Section Goals

- Understand how eigenvectors are related to null-space problems and why they are mutually linearly independent.

- Develop necessary criteria for the existence of eigenvectors, which permits the derivation of eigenvalues.

Section Objectives

- Define the eigenvalue/eigenvector problem and derive its associated auxiliary equations.

- Provide an example of finding eigenvectors and prove theorem 5.1.2 on page 307, which states that eigenvectors of different eigenvalues are linearly independent. This fact coupled with the linear independence of basis vectors shows that the set of eigenvectors manifesting from a square matrix are mutually linearly independent. [1]

- Begin discussions that connect eigenvalue to non-invertibility of matrices.

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[1] This means that if we find enough eigenvectors then due to the basis theorem of 4.5 we automatically have a basis for $\mathbb{R}^n$. This is often the case but, unfortunately, it is not guaranteed.