MATH-332: Linear Algebra Chapter: 5

Eigenvalues and Eigenvectors

Section 5.2: The Characteristic Equation

pgs. 310 - 316 *July 21, 2009*

Lecture: The Characteristic Equation

Topics:	Characteristic Equation Spectra Algebraic Multiplicity Similar Matrices
Problems	Prac: 1 Prob: 7, 9, 17, 13, 21, 22, 23, 25

Section Goals

- Understand how eigenvalues can be found by requiring that $\mathbf{A} - \lambda\mathbf{I}$ be a non-invertible matrix.
- Develop necessary criteria for matrices to share the same spectrum.

Section Objectives

- Define the characteristic polynomial through the determinant of $\mathbf{A} - \lambda\mathbf{I}$ and explain how the fundamental theorem of algebra states that this n^{th}-degree polynomial will have n-roots counting algebraic multiplicity.
- Provide examples of spectra calculation highlighting the concept of algebraic multiplicity.
- Prove theorem 5.2.4 on page 315, which states that similar matrices have the same characteristic polynomial and thus the same spectrum.