DEFINITIONS AND THEOREMS TO MEMORIZE FOR THE FINAL

DEFINITIONS

Definitions of Eigenvalue and Eigenvector
Let A be an $n \times n$ matrix. The scalar λ is called an **eigenvalue** of A when there is a *nonzero* vector $\mathbf{x}$ such that $A\mathbf{x} = \lambda\mathbf{x}$. The vector $\mathbf{x}$ is called an **eigenvector** of A corresponding to λ.

Definition of a Diagonalizable Matrix
An $n \times n$ matrix A is **diagonalizable** when A is similar to a diagonal matrix. That is, A is diagonalizable when there exists an invertible matrix P such that $P^{-1}AP$ is a diagonal matrix.

Definition of Symmetric Matrix

A square matrix A is **symmetric** when it is equal to its transpose: $A = A^T$.

THEOREMS

Theorem 7.2: Eigenvalues and Eigenvectors of a Matrix
Let A be an $n \times n$ matrix.

1. An eigenvalue of A is a scalar λ such that $\det(\lambda I - A) = 0$. W

2. The eigenvectors of A corresponding to λ are the nonzero solutions of $(\lambda I - A)\mathbf{x} = \mathbf{0}$ is called an **eigenvector** of A corresponding to λ.

Theorem 7.3: Eigenvalues of Triangular Matrices

If A is an $n \times n$ triangular matrix, then its eigenvalues are the entries on its main diagonal.