Introduction

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Slides: These slides will be on myUni after the lectures. What they contain is mostly in the Student Notes.

Mathematics 1 Test
Sem 2, Week 8, Mon 15 — Fri 19 Sept

There is a short answer Test next week which counts 5% towards the final grade. The test will be conducted in your Computer Practical.

The Algebra section of the test will be answered using the Matlab package, so please bring your Matlab manual to the Test.

The Test will cover the work in: Weeks 1 — 6 (Lectures 1 — 12).

Anyone who may have difficulties in attending the Test in their Computer Practical should contact either:

David Parrott (104) or Caroline Snelling (G23b) as soon as possible.

8.2 Eigen-properties

Recall that a non-zero vector $\mathbf{v}$ is an eigenvector of the $n \times n$ matrix A if there is a number λ, such that

$$A\mathbf{v} = \lambda\mathbf{v}$$

λ is the eigenvalue corresponding to $\mathbf{v}$.

To find the eigenvalues and eigenvectors of a matrix A:

(i) solve the characteristic equation $\det(\lambda I - A) = 0$ to determine the eigenvalues λ;

(ii) for each eigenvalue λ, solve the vector equation $(\lambda I - A)\mathbf{x} = \mathbf{0}$ to determine the eigenvectors $\mathbf{x}$.

Diagonalisation

The $n \times n$ matrix A is diagonalized by the invertible matrix P if $P^{-1}AP = D$ is a diagonal matrix.

Not all matrices can be diagonalised.

- ◇ A is diagonalisable if and only if A has n linearly independent eigenvectors
- ◇ The columns of P are the eigenvectors.
- ◇ The diagonal matrix D consists of the n eigenvalues of A.
- ◇ The order of the eigenvectors in P determines the order of the eigenvalues in D.