Topics for study

Study Topics from Test 1

Lecture #1: review material

Lecture #2:
Inner products, Orthogonality, and unitary matrices
Interpretation of multiplication of a vector by a unitary matrix.

Lecture #3:
Vector norms (you do not need to PROVE that for fin. dim. spaces, all norms all equivalent, up to constants.)
Matrix norms (Frobenius and operator norms)

Lecture #4-5:
Singular Value Decomposition: existence, uniqueness, and applications
Full and Reduced SVD
** Now that you have the background, read the section on "Computation of the SVD" on Page 36.

Lecture #6:
Projectors: properties and constructions (orthogonal & general bases)
Complementary and orthogonal projectors

Lecture #7:
QR factorizations: existence, uniqueness questions
Both full and reduced QR
Application to Solution of Ax=b

Lecture #8:
Gram-Schmidt Projections
The modified Gram-Schmidt algorithm, pseudo code, and computational complexity
Triangular Orthogonalization.
Study Topics from Test 2
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Lecture #9:
Understand and be able to discuss experiments.

Lecture #10
Householder reflections and their properties
QR factorization
Algorithms 10.1-3
Computational Complexity

Lecture #11
Least Squares approximation, Pseudoinverse, Orthogonal projection onto column space of A
Solution Algorithms 11.1-3:
  a. Normal equations and Cholesky factorization of $A^T A$
  b. QR factorization of $A$
  c. SVD of $A$

Lecture #12
Definitions of Conditioning and Condition numbers: Examples.

Lecture #14
Definitions of Stability and Relative Stability
Theorem 14.1 (independence of norm)

Lecture #15
Theorem 15.1.

Lecture #16
Understand and be able to discuss experiments.

Lecture #20-21
Gaussian Elimination and Pivoting (all)

Lecture #23

Study Topics since Test 2
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Lecture #24-26
Review e-values, e-vectors and their properties
Geometric/Algebraic multiplicities; Diagonalizability
Similarity transformations & invariants
The Schur Factorization
Two Steps for e-value estimation
The Hessenburg form

Lecture #27
Rayleigh quotient and its properties
Power iteration
Spectral mappings: shifts and inverse iteration
SVD