Numerical Analysis Q Exam Syllabus 2002

Accuracy, stability and conditioning

KMN 2.1-2.2 or H 1.2-1.3

Linear Algebra

Norms & condition numbers	GVL3 2.2, 2.3, 2.7 or H 2.3
Gaussian elimination	GVL3 3.1,3.2,3.4 or H 2.4
Cholesky and LDL^T factorization	GVL3 4.1,4.2 or H 2.5.1
Symmetric eigenvalue problem & Power method	GVL3 8.1, 8.2 or H 4.2, 4.4, 4.5.1
Singular Value Decomposition (SVD)	GVL3 2.3, 6.5 or H 3.6

Optimization

Least squares, normal eqs & QR factorization	GVL3 5.1,5.2,5.3 or H 3.1-3.5
Newton's method (nonlinear equations)	DS 2.2,2.4,5.1,5.2 or H 5.5,5.6.2
Newton's method (optimization)	DS 5.5 or H 6.4.3, 6.5.3

Initial Value Problems

Basic theory	H 9.1 or KMN 8.1
Forward & backward Euler, stability and order	KMN 8.4,8.5,8.8 or H 9.2,9.3.1-9.3.4

Comments: Where several texts are listed, you need to read only one, but you also must understand the principles underlying the material (which are usually facts from linear algebra or calculus). GVL3, DS and KMN are often more in-depth than H.

References

[DS] J. E. Dennis and R. B. Schnabel, *Numerical Methods for Unconstrained Optimization and Nonlinear Equations,* Prentice Hall, 1983.

[GVL3] G. Golub and C. Van Loan, *Matrix Computations, 3rd Ed.*, Johns Hopkins Univ. Press, 1996. (Note that earlier editions also cover the syllabus material but some sections are numbered differently.)

[H] M. Heath, *Scientific Computing: An Introductory Survey 2nd Ed,* McGraw Hill, 2002. (Note that the first addition also covers the syllabus material but some sections are numbered differently.)

[KMN] D. Kahaner, C. Moler and S. Nash, *Numerical Methods and Software,* Prentice Hall, 1989.