

MATH 640A Study Guide for the Final Exam Fall 2002

When: Thursday 21 November, 10:10am–12 noon.

Where: Our classroom 215 Morton.

What is covered: Sections 4.0–4.7 and 5.0–5.4.

There will be no specific questions about Chapters 1–3, but concepts like loss of significance may appear.

The exam will consist of two problems, one from a topic in Chapter 4, and the other from a topic in Chapter 5. Possible topics are

Chapter 4 • Gaussian elimination/ LU decomposition.

- Gauss-Seidel iterative method.
- Steepest descent.

Chapter 5 • Power method.

- Least-squares problems via QR decompositions.
- Singular value decomposition.

Other topics will appear only as side issues in the main topic. You need to know their definitions and properties, but not how to construct them or prove the theorems. Be able to compare and contrast them to the main topic.

You can completely ignore Crout's factorization, Cholesky's factorization, complete pivoting, equilibration, SOR, SSOR, extrapolation, Chebyshev acceleration, Aitken acceleration, and Schur's factorization.

The problem will be something like:

- State the problem that this technique is trying to solve. Describe how the algorithm works. Do it on a small example. Describe when it fails. Analyze its numerical properties. Compare it to other methods for the same purpose. Give a recommendation on when it should be used.