Matrices PreLim Exam Spring 2005
Professor Peter Nylen

Directions Answer the "state definition/theorem" part of each question. Answer the "prove" part for at least 5 (out of 7) of the problems.

1. State and prove necessary and sufficient condition for an $n \times n$ matrix to be similar to a diagonal matrix.

2. State and prove Schur's Triangularization theorem

3. State and prove the Cayley Hamilton Theorem.

4. State the definition of normal matrix; State and prove the theorem on diagonalization of normal matrices.

5. State the interlacing inequalities for Hermitian matrices. Prove the necessity part of this theorem.

6. State Perron's Theorem for positive matrices.

7. State the definition of irreducible matrix, primitive matrix, and state the theorem on the structure of a non primitive irreducible nonnegative matrix.

8. State and prove Gershgorin's Theorem.

9. State the definition of completely positive matrix, state the theorem on the eigenvalues of a completely positive matrix, prove this theorem.