Study guide for Chap 07 and Chap 08

The exam problems will be closely related to your homework problems. Make sure you understand all the homework problems.

1. Section 7.3:

   Study and memorize the definitions of Jacobi and Gauss-Siedel Iterations.

2. Section 7.3:

   When the matrix decomposition $A = M - N$ is used in the iteration

   $$Mx^{(k)} = Nx^{(k-1)} + b$$

   to solve the linear system $Ax = b$, study the necessary and sufficient conditions (in terms of $\rho(T)$ and/or $\|T\|$) for this iteration to converge to a unique solution.

3. Section 7.4:

   Study the derivation of SOR. Need not memorize the formula. The formula of SOR will be given explicitly if needed.

   Section 7.5:

   Read page 476-478, skip page 479 and on.

   Study and memorize the definition of condition number of a matrix. Study the derivation of (7.20) and how it can be used to predict the accuracy of numerical solution of a linear system (such as how many correct digits you will get in double precision arithmetic).

   Study the relation between absolute error and the residue vector (see proof of Theorem 7.27).

4. Section 8.1:

   Study the blackboard note on Discrete least square problems. Repeat the derivation for the continuous version (Homework 17, problem 2).