

Study guide for Chap 02 and Chap 10

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

1. Section 2.1-2.2: Study how to estimate number of iterations needed for linearly convergent methods such as bisection and fixed point iteration.
2. Section 2.2: Study the convergence proof and error estimate (Theorem 2.3, 2.4, Corollary 2.5) for fixed point iteration.
3. Section 2.2: Study how to modify (generalize) the fixed point iteration when it does not converge.
4. Section 2.3: Study the secant method and method of false position. In particular, how to get p_{n+1} from previous p_n 's.
5. Section 2.1-2.3: Review programming for bisection, fixed point iteration, Newton's method and secant method.
6. Section 2.4: Review relevant estimates for fixed point iteration and Newton's method. Also how to accelerate convergence of Newton's method in case of multiple roots. Study problem 13 thoroughly, understand why it gives 3rd order convergence (cubic convergence).
7. Section 10.1-10.2: Study Newton's Method for systems of nonlinear equations. Practice the implementation.

Study how to transform $f(x) = 0$ into $x = g(x)$ in the case of systems of equations and solve it with fixed point iteration. Study how to accelerate convergence by a proper choice of the parameter matrix α . Practice the implementation.