

Preparation guide for midterm 01

Oct 02, 2009.

Most of the exam problems will be closely related to your homework problems. Check the list below and then if you are not confident with some of the items, study the textbook and related homework problems.

1. Be able to write down the Taylor approximation and estimate the error of Taylor approximation in terms of the remainder term.
2. Be able to write down the Taylor approximation for functions of two or more variables.
3. Understand the advantage of nested multiplications. Be able to correctly calculate operation count in polynomial evaluation.
4. Know how to avoid loss of significance resulting from subtraction. Study all the examples in the text and the homework problems.
5. Understand how many bits it takes to store a floating number. Study IEEE single/double precision as examples (But need not memorize the details).
6. Be able to derive and estimate propagation of errors due to multiplication, division and composition of functions.
7. Understand how to perform bisection, Newton's iteration, secant method and fixed point iteration. Understand how to device a convergent fixed point iteration.
8. Understand order of convergence. Understand how to estimate of convergence for above methods. For example, Newton's method for a simple root, fixed point iteration for a double root, etc.
9. Know the Lagrange's formula and Newton's formula (divided difference) for polynomial interpolation. Study properties of Lagrange's interpolating polynomials and properties of Divided differences.
10. (programming)
Study all the sample programs provided on author's web page. You will be asked to download and modify/manipulate these codes. In midterm 2 and final exam, you may have to write codes from scratch, but not this time.