Quiz Date: Friday, 08 February, 2019

Textbook Reading: Section 2.3 (Newton's method), 2.4 (error analysis for root-finding), 3.1 (Lagrange interpolating polynomial), lecture notes on *Modified Lagrange interpolant*.

Reminder: solutions will not be posted, but the TAs are expecting you to bring your questions to the tutorials. You may also bring questions to the Wednesday afternoon office hours.

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0) Basic Ideas
Be very familiar with the following:

- the geometry of the Newton's method,
- definition of order of convergence,
- error update formulas & convergence rates for BiS, SM & NM,
- Vandermonde linear system for monomial interpolation,
- Lagrange interpolating polynomial & its modification,
- interpolation error estimate (theorem 3.3).

1) Newton's Method & Order of Convergence
Textbook problems from Section 2.4:

#1 Be prepared to do several iterations using a calculator.

#7 Linear convergence, but note that the λ value is right on the edge for convergence . . .

#8 (a) what is the limiting λ? And does this value matter for the convergence?

Optional:

- In lecture, the error update for Newton's method was derived using the Taylor expansion. Show that the exact same methodology, but used on the SM update formula gives the Fibonacci recursion that is given in the lecture notes.

2) Polynomial Interpolation
Textbook problems from Section 3.1:

#1 Find the polynomial using both the monomial and Lagrange basis functions.

#3 Examples 3 & 4 demonstrate how to get the Lagrange interpolation error bound.

#5 (a) Be prepared to do interpolation with a calculator.

#7 (a) You need to understand how to interpret the error bound.

3) Modified Lagrange Interpolant
From the lecture notes:

- Set up the modified Lagrange interpolant for problem 5(a) above and $N = 2$. In what ways does it look like a better formula to use — even on a calculator?