Midterm I: Some problems for review

The exam will be taken in class (SCB 303) on Wednesday 2/11. You will do the exam on paper. You can use a pocket calculator of any kind. Phones, laptops, and notecards are not allowed. The instructor will provide scratched papers for you.

Other exam policies:

The proctor may reassign your seat at the beginning or at any time during the exam.

Using a phone or any unauthorized assistance while the exam is in progress, whether inside or outside of the classroom, is prohibited.

If you need to leave the room for any reason, you must first obtain the proctor's permission. If the proctor is not present in the room and you want to leave, you must wait until he/she comes back.

Violation of any of the above policies is considered as cheating and may result in a score of zero.

The topics to be covered are

- Root-finding methods: bisection, chord, Newton-Raphson, fixed-point methods
- Order of convergence
- Interpolation polynomials: Lagrange, Newton method
- Approximate value of a function or its derivatives using divided differences.

You should review the homework problems, worksheets, quizzes, examples given in the lectures. It is always a good idea to study for the exam with someone.

Some problems to practice:

1) Show that the equation $x - \cos x = 0$ has exactly one real solution. Then use an appropriate numerical method to find a solution correct to the nearest thousandth.

2) Show that the equation $x^4 - 4x^3 + 4x^2 - 2 = 0$ has exactly two real solutions. Then use an appropriate numerical method to find a solution correct to two decimal places.

3) Find a quadratic polynomial that matches $f(x) = 2^x$ at $x = 1, 2, 3$.

4) Use the quadratic polynomial found above to find approximately $\int_1^3 \frac{2^x}{x} dx$.