Review Questions for the Midterm

The midterm on Feb. 16th will cover materials from §1.1, 1.2, 2.1, 2.3, 2.4, 3.1, 3.2, and 8.3

1. Derive the bisection method, the Newton's method, the secant method, the method of false position. Give geometric intrepretations. Compare all the methods. Discuss the sufficient conditions for convergence, the order of convergence and the bounds for the absolute error.

2. Review the following theorems: intermediate value theorem, mean value theorem, Taylor's theorem, Rolles' theorem. For each one, find an example where it has been used in this course.

3. Given the table of x versus $\sin x$ do the following:

x	$\sin x$
$-\frac{\pi}{6}$	$-\frac{1}{2}$
0	0
$\frac{\pi}{6}$	$\frac{1}{2}$

a. Find the Lagrange interpolating polynomial of degree 2 using the data on the table on interval $[-\frac{\pi}{6}, \frac{\pi}{6}]$ Find the error bound of $|\sin x - P_2(x)|$.
b. Use divided differences to get $P_2(x)$ interpolating polynomials. What's the error bound of $|\sin x - P_2(x)|$?

4. a. Find the zeros of the monic Chebychev polynomial $\tilde{T}_3(x)$.
b. Construct the Lagrange interpolating polynomial $P_2(x)$ using the zeros of $\tilde{T}_3(x)$ on interval $[-1, 1]$.
c. What's the error bound of $|\sin x - P_2(x)|$?