Math 110 Exam 2 topics: In Class Portion

This is a cumulative course so you should expect to see some of the topics/problems from the first exam. So review the first exam as well as the topics sheet passed out before that exam, the sample exam, and the take home portion.

New problems/topics that will be included on the second exam include the following:

Solving new boundary value problems using separation of variable, variation of parameter, and change of variable methods.
e.g. #1 p 133, #5 p141, 1a p165.

Know how to solve various Sturm-Liouville problems using the computer. e.g. + possibly a problem from p 176-177.

Know how to normalize eigenfunctions and how to use them to compute Generalized Fourier coefficients (using the computer).

Know the important results about Sturm-Liouville problems:

- Orthogonality conditions Theorem p 163 (what is the "weight function"?)
- Conditions when Eigenvalues are real (Corollary p 165)
- Uniqueness of Eigenfunctions (Theorem 1 p 168)

Know the statement of the main Fourier theorem proven in class.

If GIVEN the formulas for sine series, cosine series, or Fourier series coefficients, be able to use Mathematica to compute the coefficients on any interval: e.g. #1-4, page 101. (You should know these formulas for the basic intervals $[-\pi,\pi]$ and $[0,\pi]$).

Know the definitions: piecewise smooth, piecewise continuous, orthonormal set, closed, complete, $f_R(x)$, $f'(x+)$, eigenvalue, eigenfunction, regular Sturm-Liouville problem, Bessel's equation.