Review 3

1. Determine the form of the eigenfuctions and the equation satisfied by the eigenvalues, and estimate the eigenvalues of large absolute value for the following boundary value problem

$$y'' = \lambda y, \quad y'(0) = 0, \quad y'(\pi) = 0.$$

   Then normalize the eigenvectors (i.e. the eigenfunctions).

2. Determine the form of the eigenfuctions and the equation satisfied by the eigenvalues, and estimate the eigenvalues of large absolute value for the following boundary value problem

$$y'' = \lambda y, \quad y(0) = 0, \quad y(\pi) = 0.$$

   Then normalize the eigenvectors (i.e. the eigenfunctions).

3. Determine the form of the eigenfuctions and the equation satisfied by the eigenvalues, and estimate the eigenvalues of large absolute value for the following boundary value problem

$$y'' = \lambda y, \quad y(0) = 0, \quad y(1) - y'(1) = 0.$$

   Then normalize the eigenvectors (i.e. the eigenfunctions).

4. Determine the form of the eigenfuctions and the equation satisfied by the eigenvalues, and estimate the eigenvalues of large absolute value for the following boundary value problem

$$y'' = \lambda y, \quad y(0) + y'(0) = 0, \quad y(1) = 0.$$

   Then normalize the eigenvectors (i.e. the eigenfunctions).

5. Determine if the following boundary value problems are self-adjoint or not

$$x^2y'' + xy' = \lambda y, \quad y(0) = 0, \quad y(1) = 0,$$
$$xy'' + y' = \lambda y, \quad y(0) = 0, \quad y(1) = 0.$$

6. Determine if the following boundary value problems are self-adjoint or not

$$y'' = \lambda y, \quad y(0) + 2y'(0) = 0, \quad 2y(1) + y'(1) = 0,$$
$$(1 - x^2)y'' - xy' = 0, \quad y(0) - y'(0) = 0, \quad y(1) - y'(1) = 0.$$