P&A, Week 6 (Tuesday)

Math 440

Consider the ODE

$$\frac{\partial^2 \phi}{\partial x^2} + \lambda \phi = 0$$

Determine the eigenvalues,λ, and corresponding eigen functions if ϕ satisfies the following boundary conditions. Analyze all three cases where ($\lambda > 0, \lambda = 0, \lambda < 0$). You may assume the eigenvalues are real.

(a) $\phi(0) = 0,\ \phi(1) = 0$

(b) $\frac{\partial \phi}{\partial x}(0) = 0, \frac{\partial \phi}{\partial x}(L) = 0$