

Properties for these Other Types of S-L Systems

① There are infinity number of Eigenvalues (λ_n) all real with increasing order: $\lambda_1 < \lambda_2 < \dots \rightarrow \infty$ & $y_n(x)$ will oscillate (meaning it will have one more zero than $y_{n-1}(x)$).

② The Eigenfunctions are orthogonal;

$$\int_0^L y_n(x) y_m(x) w(x) dx = 0, \quad \lambda_n \neq \lambda_m$$

↓ weighted
function

③ The Eigenfunctions are complete;

$$f(x) = \sum_{n=1}^{\infty} C_n y_n(x)$$

$$C_n = \frac{\int_0^L f(x) y_n(x) w(x) dx}{\int_0^L (y_n(x))^2 w(x) dx}$$