LECTURE 7

Functions are orthogonal on $a \le x \le b$ if

$$\int_a^b u_m^*(x)\, u_n(x)\, dx = \begin{cases} 0 & m \neq n \\ I_n & m = n \end{cases}$$

Use as basis functions to expand

$$f(x) = \sum_n c_n u_n(x)$$

where

$$c_n = \frac{1}{I_n} \int_a^b u_n^*(x)\, f(x)\, dx$$

Eigenfunctions form complete sets of orthogonal functions (at least for equations met in physics)