

# Numerical Computing

## Lecture 1

### Problem.

$$\text{let } F''(x) + 2F'(x) \cdot F(x) = 0$$

Conditions  $\rightarrow$  Initial Value  
 $\rightarrow$  Boundary Value

Initial Conditions

$$\text{Boundary Conditions } \left\{ \begin{array}{l} F(0) = 1 \\ F(1) = 0 \end{array} \right. \quad \text{and} \quad F'(0) = 0$$

Using some numerical approach

$S_A$  = Approximate Solution  $\rightarrow$  apni numerical scheme ko use kr k.

$S_E$  = Exact Solution.  $\rightarrow$  Satisfies equations and conditions

Errors : [ use in any type of method to check the accuracy of said method ]

Absolute

Residual

$$E_A = |S_E - S_A|$$

$$E_R = \left[ \text{put approximate solution back in original equation} \right] \Rightarrow \frac{|S_E - S_A|}{|S_E|}$$

$x$	Abs. error
0.1	$1.4 \times 10^{-2}$
0.2	$1.1 \times 10^{-6}$
0.3	$5.8 \times 10^{-9}$
0.4	$6.1 \times 10^{-15}$ Minimal