Theoretical Assignment 1: Finite Difference Method

Deadline 31/07/2020

Let $\Omega = (0,1) \subset \mathbb{R}$ and $f \in L^2(\Omega)$.

$$-u_{xx} = f(x) \quad \text{in } \Omega$$

subject to a Dirichlet boundary condition:

$$u(0) = 0, \ u(1) = 0$$

1. How to discretize the previous system equation by finite difference method with non-uniform mesh.

2. Prove the convergence of scheme.