

Technische Numerik 2

Exercise sheet 2, March 18, 2019

Exercise 4: Compute the entries of the one-dimensional mass matrix M_h ,

$$M_h[j, k] = \int_a^b \varphi_k^1(x) \varphi_j^1(x) dx,$$

for an equidistant decomposition of the interval $[a, b]$.

Exercise 5: Set up the system of linear equations for the finite element discretization of the Dirichlet boundary value problem

$$-u''(x) + u(x) = 9x \quad \text{for } x \in (0, 1); \quad u(0) = 0, \quad u(1) = 0$$

for an equidistant decomposition with meshwidth $h = 1/3$.

Exercise 6: What are the matrix entries of the stiffness and the mass matrix for a non-equidistant decomposition, i.e., for grid points $x_j = x_{j-1} + h_j$ for $j = 1, \dots, N$?