

MATH 566 Spring 2009
Finite Element Homework
Due May 1, 2009

Solve the following problem with the Galerkin Finite element method, using the piecewise polynomials given in class, with $m = 5$. Form the matrix system by hand and find the system solution in Matlab. Hand in your written work, along with a plot of the numerical solution together with the exact solution $u(x) = -e^x + (e - 1)x + 1$.

$$\begin{aligned} -\frac{\partial^2 u}{\partial x^2} &= e^x & 0 < x < 1 \\ u(0) &= 0 \\ u(1) &= 0 \end{aligned}$$