Numerical PDE HW 4

Finally some Finite Element (FE) stuff

1. For the Dirichlet problem (D) on p14 with with $f[x] = \text{Sin}[x]$ set up the piecewise linear FE problem ffor the mesh 0.0, 0.1, 0.5, 0.7, 1.0. I want to see an explicit 3 by 3 stiffness matrix A and an explicit 3 vector b. Solve for the nodal u values and plot them with dots on and straight lines joining the data points including the zero boundary values.

2. Write code for (D) that generates A and b from a list of nodal values (including end points) and a function f.

3. Use this code to produce and plot a decent looking solution to (D) with $f = \text{Sin}[x^3]$ on $0.0 < x < 2.0$

4. Repeat problem(3) with $f = \begin{cases} 0 & 0.0 < x < 0.1 \\ 100 & 0.1 < x < 0.4 \\ 2 & 0.4 < x < 2.0 \end{cases}$