Activity:

1. Write matlab code to solve our heat equation with Neumann BCs using the finite element method.

2. An insulated heated rod with a uniform heat source can be modeled by Poisson’s equation:

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Given a heat source *f*(*x*) = 25 and boundary conditions *u*(0) = 40 and *u*(10) = 200.

1. Write the finite element system of equations with *h* = 2.
2. Solve using matlab.
3. Solve in matlab using *h* =0.2 (or larger if required by matlab)

3. The following is a simple reaction-diffusion equation describing the steady-state concentration, *c*, of a substance that reacts in a long reactor and disperses axially:

where *D* = 1.5 = the dispersion coefficient,

*k* = 5 = reaction rate

*L* = 100.

Boundary conditions are given by *c*(0) = 0.1 and *c*(*L*) = 1.

1. Write the system of equations.
2. Solve in matlab using finite differences with *h* = 20.
3. Repeat with *h* = 2 (or as small as matlab will permit)

4.