MATH5004 Tutorial 6
1D Semi-Space Finite Element formulation

Exercise 1. Consider the two-point BVP:

$$-pu'' + qu = 1, \quad 0 < x < 1,$$

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

   a) Derive Variable statement
   b) Discretise domain into 4 linear elements and apply Galerkin method to the problem in a)
   c) Construct element matrix, element load vector and assemble all elements together to obtain global matrix system.

Exercise 2. Derive Finite element equations of an unsteady two-point BVP:

$$u_t - u_{xx} = 1, \quad x \in (0,1), t \in (0, \tau)$$

subject to IC: $u(x, 0) = 0$, and each of the following BCs

   a) $u(0, t) = f, \quad u(1, t) = g$
   b) $u(0, t) = f, \quad \frac{\partial}{\partial x} u(1, t) = g$

Assignment II

Question 1. (LUT-WK6)

Discretise spatial domain into 4 linear elements and derive Finite element equations based on Galerkin method of an unsteady two-point BVP:

$$u_t - u_{xx} = 1, \quad x \in (0,1), t \in (0, \tau)$$

subject to IC: $u(x, 0) = 0$, and $\frac{\partial}{\partial x} u(0, t) = f, \frac{\partial}{\partial x} u(1, t) = g$

Note: Assignments II (25%): Assignment Questions will be given weekly.

In this week, Questions 1 (TUT-WK6) is a part of Assignment II, please submit a document file (typesetting using Microsoft word or LATEX) via Blackboard by the due date of Assignment I on Friday 23 October 2020