DEPARTMENT OF MATHEMATICS
IIT GUWAHATI

MA 473 Computational Finance Lab – VII Date: 10.09.2024

1. Consider the following two-point boundary-value problem (BVP):

$$\begin{cases} -u''(x) + (2x-3)u'(x) = 2x+1, & x \in (0,1) \\ u(0) = u(1) = 0. \end{cases}$$

Solve the above BVP by using the following finite element methods (FEMs):

(a) Piecewise-linear basis functions and trapezoidal rule for the numerical quadratures.

(b) Piecewise-linear basis functions and Simpson's rule for the numerical quadratures.

2. Consider the following two-point boundary-value problem (BVP):

$$\begin{cases} -\dfrac{d}{dx}\left(\dfrac{du}{dx}\right) + (2x+1)u(x) = \sin(x), & x \in (0,1) \\ u(0) = u(1) = 0. \end{cases}$$

Solve the above BVP by using the following finite element methods (FEMs):

(a) Piecewise-linear basis functions and trapezoidal rule for the numerical quadratures.

(b) Piecewise-linear basis functions and Simpson's rule for the numerical quadratures.

The output files should contain the following for above problem(s):

Plot the numerical solutions of all sub-parts.
