

DEPARTMENT OF MATHEMATICS, I.I.T. GUWAHATI

MA 473: Computational Finance Lab – VIII (18/10/2021)

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:

- (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.
- (c) Piecewise-quadratic basis functions and trapezoidal rule for the numerical quadratures.
- (d) Piecewise-quadratic basis functions and Simpson's rule for the numerical quadratures.

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

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

Solve the above BVP by using the following:

- (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.
 - (c) Piecewise-quadratic basis functions and trapezoidal rule for the numerical quadratures.
 - (d) Piecewise-quadratic basis functions and Simpson's rule for the numerical quadratures.
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