
CS 374 : COMPUTATIONAL AND NUMERICAL
METHODS

SET 7

THE BISECTION METHOD

PURVIL MEHTA (201701073)
BHARGEY MEHTA (201701074)

*Dhirubhai Ambani Institute of Information and Communication Technology
Gandhinagar*

SEPTEMBER 26, 2019

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1 Question-1

1.1 Plots

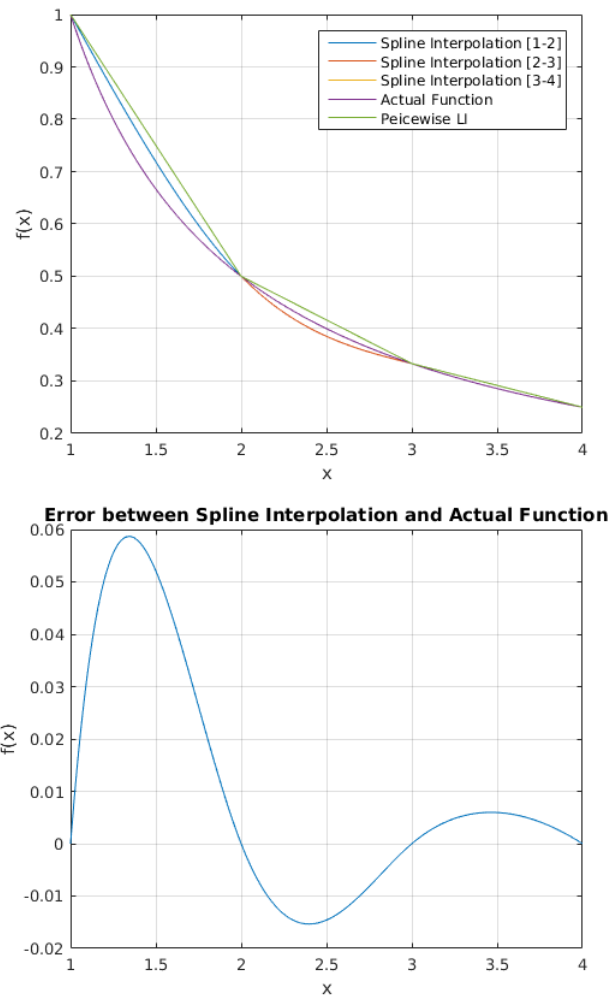


Figure 1: Comparison of Linear Piece wise, Spline and Actual function and it's Error

2 Question-2

2.1 Plots

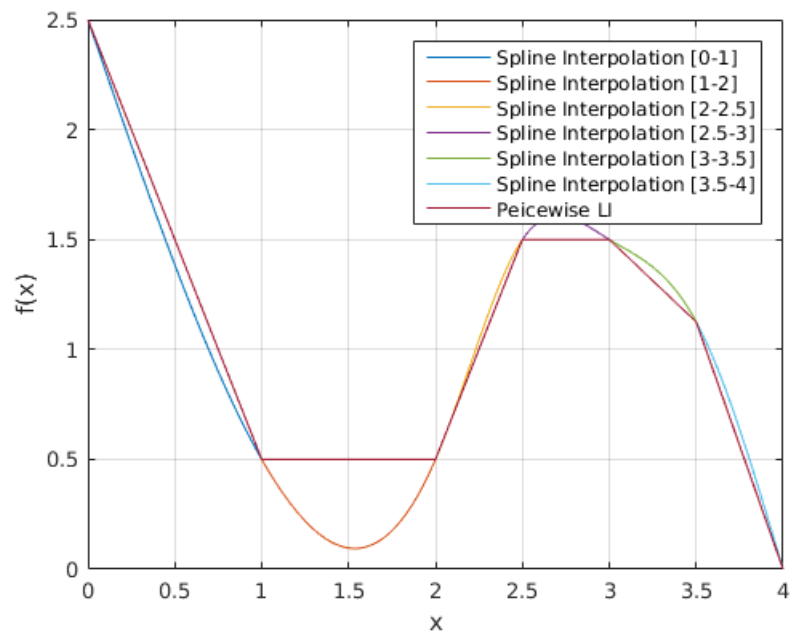


Figure 2: Comparison of Linear Piece-wise and Spline

3 Question-3

3.1 Plots

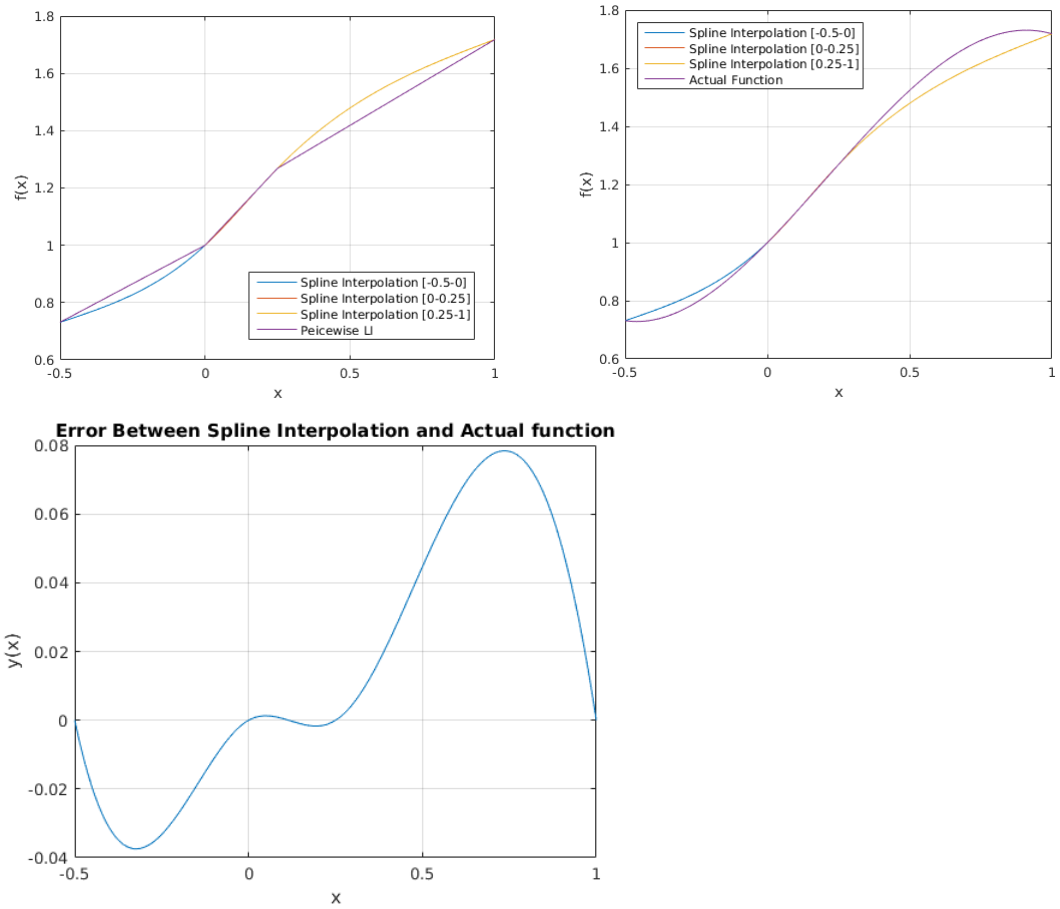


Figure 3: Comparison of Linear Piece-wise and Spline Interpolation and It's Error

4 Question-4

4.1 a

4.1.1 Equations

$$s(x) = \begin{cases} x^3 - x + 1 & x \in [0, 1] \\ -x^3 + 6x^2 - 7x + 3 & x \in [1, 2] \end{cases}$$

4.1.2 Plots

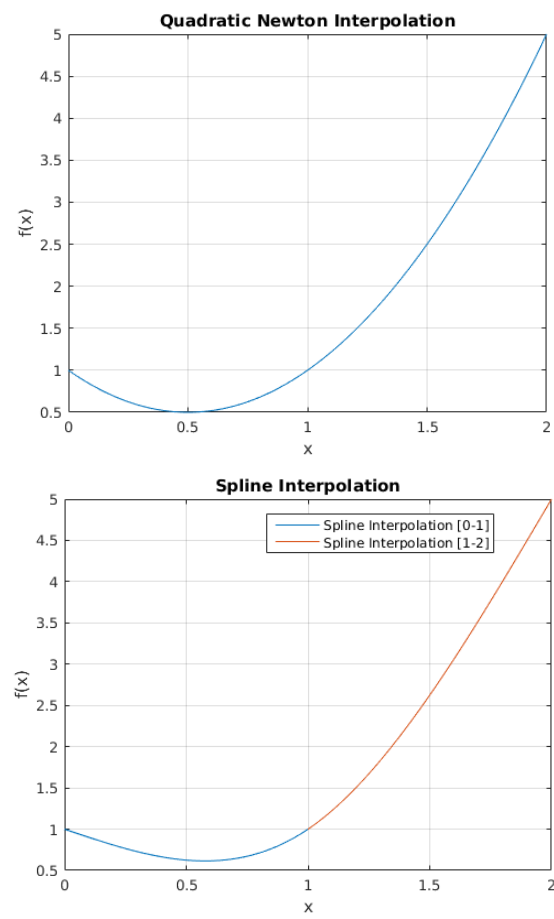


Figure 4

4.2 b

4.2.1 Equations

$$s(x) = \begin{cases} \frac{47x^3}{56} + \frac{411x^2}{56} - \frac{79x}{4} + \frac{125}{7} & x \in [1, 2] \\ \frac{47x^3}{56} + \frac{411x^2}{56} - \frac{79x}{4} + \frac{125}{7} & x \in [2, 3] \\ \frac{23x^3}{56} + \frac{195x^2}{56} - \frac{229x}{28} + \frac{44}{7} & x \in [3, 4] \\ \frac{27x^3}{56} - \frac{405x^2}{56} + \frac{971x}{28} - \frac{356}{7} & x \in [4, 5] \end{cases}$$

4.2.2 Plots

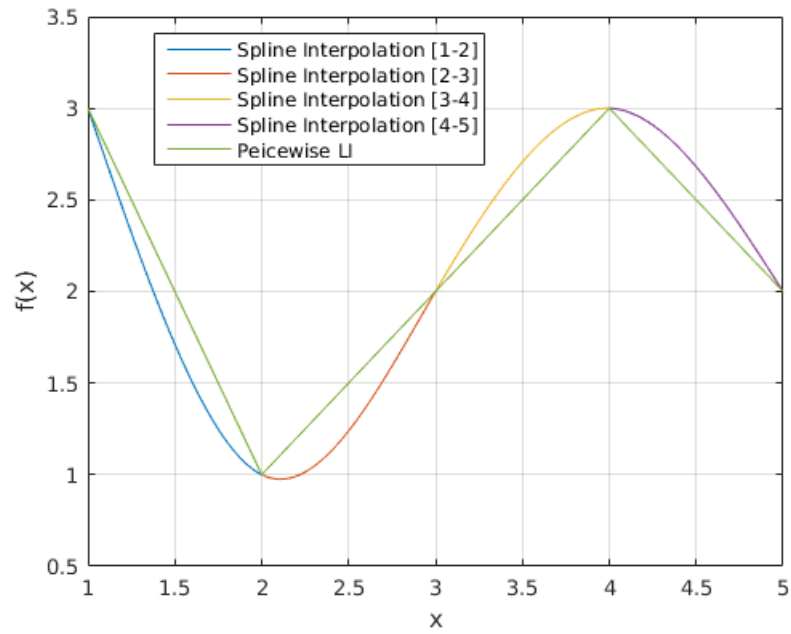


Figure 5

4.3 c

4.3.1 Equations

$$s(x) = \begin{cases} 1.81x^3 + 0.047x & x \in [0, 0.5] \\ -5.048x^3 + 10.3x^2 - 5.1x + 0.85 & x \in [0.5, 1] \\ 2.52x^3 - 12.43x^2 + 17.62x - 6.71 & x \in [1, 2] \\ -0.91x^3 + 8.14x^2 - 23.52x + 20.71 & x \in [2, 3] \end{cases}$$

4.3.2 Plots

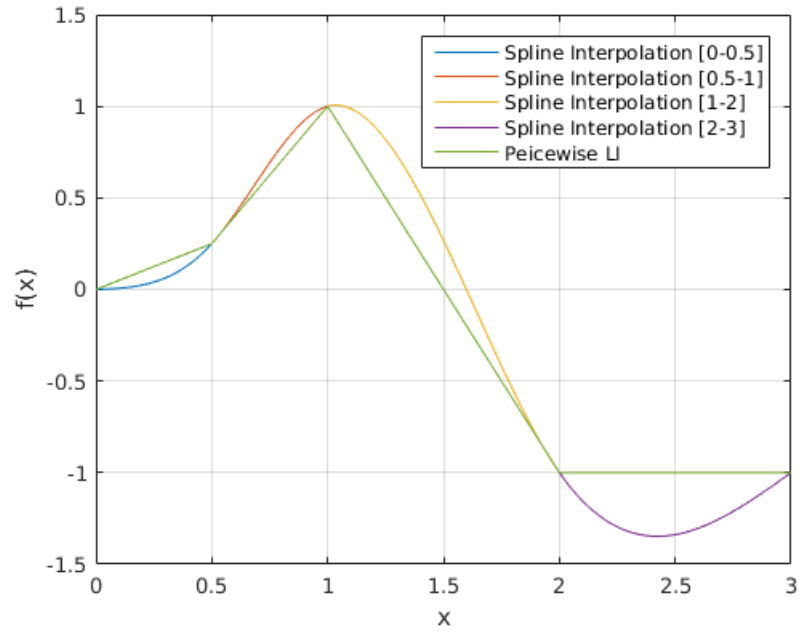


Figure 6

4.4 d

4.4.1 Equations

$$s(x) = \begin{cases} 0.45x^3 - 1.25x + 1.4 & x \in [0, 1] \\ -1.03x^3 + 4.44x^2 - 5.68x + 2.89 & x \in [1, 2] \\ 2.02x^3 - 13.85x^2 + 30.91x - 21.51 & x \in [2, 2.5] \\ -0.65x^3 + 6.16x^2 - 19.14x + 20.19 & x \in [2.5, 3] \\ -0.096x^3 + 1.16x^2 - 4.12x + 5.18 & x \in [3, 4] \end{cases}$$

4.4.2 Plots

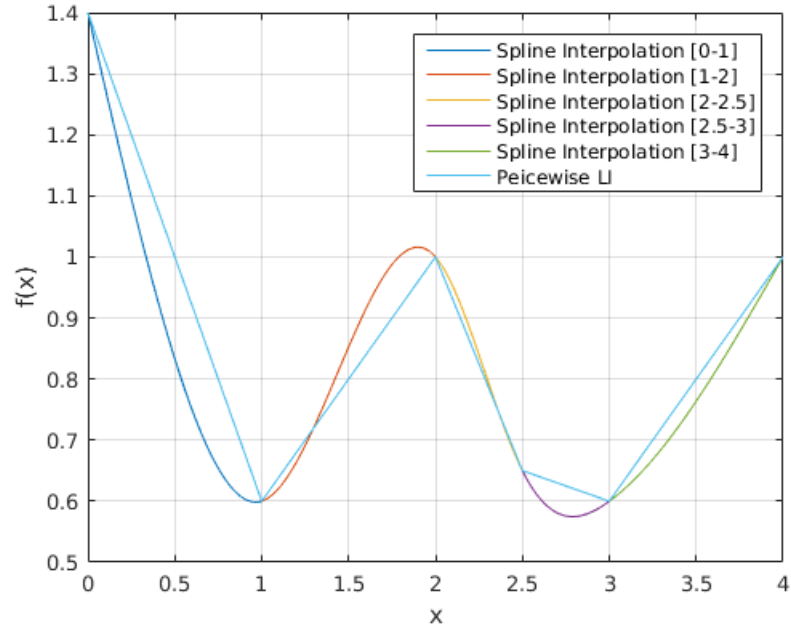


Figure 7