McGill University Department of Electrical and Computer Engineering

ECSE 443 Introduction to Numerical Methods Winter 2019

Assignment #3 Posted: March 10, 14:00   DUE: March 17, 17:00

Solve all problems. Show all your work, include all source code. All programs should be well documented, and the methods used should be clearly described. Clearly indicate the final answer. Follow instructions in the question. The assignment must be written using a word processor such as Microsoft word. Hand written submissions will not be accepted. For software portions of the project the source code as well as the output of the code will be required as part of the submission. You must include all references and sources that you used. The TA's will be instructed to look for plagiarism or other forms of misconduct and if found, will report the potential misconduct.

Given the following table of measured data, shown in the table below.

x	f(x)
0	1
0.2	0.916
0.4	0.836
0.6	0.74
0.8	0.624
1	0.40-0.29*
1.2	0.224
1.4	0.24
1.6	0.265
1.8	0.291
2	0.316
2.2	0.342
2.4	0.368

*Note that there is a discontinuity at the point x=1 where from the left the value is 0.4 and from the right it is 0.29

Question 1) (12 Marks)

a) Find f(0.23) by writing and running a code/MATLAB script using Cubic Splines interpolation. Clearly indicate all work, principles and methods used as well as clearly indicate your final answer. (4 Marks)

b) Find f(0.23) by writing and running a code/MATLAB script using Lagrange Polynomial interpolation. Clearly indicate all work, principles and methods used as well as clearly indicate your final answer. (4 Marks)

c) Find f(0.23) by writing and running a code/MATLAB script using Newton Polynomial interpolation. Clearly indicate all work, principles and methods used as well as clearly indicate your final answer. (4 Marks)

Question 2) (12 Marks)

a) Find f(0.78) by writing and running a code/MATLAB script using Cubic Splines interpolation. Clearly indicate all work, principles and methods used as well as clearly indicate your final answer. (4 Marks)

b) Find f(0.78) by writing and running a code/MATLAB script using Lagrange Polynomial interpolation. Clearly indicate all work, principles and methods used as well as clearly indicate your final answer. (4 Marks)

c) Find f(0.78) by writing and running a code/MATLAB script using Newton Polynomial interpolation. Clearly indicate all work, principles and methods used as well as clearly indicate your final answer. (4 Marks)

Question 3) (4 Marks)

a) Find f(3.0) by writing and running a code/MATLAB script using Cubic Splines *extrapolation*. Clearly indicate all work, principles and methods used as well as clearly indicate your final answer. (4 Marks)