

Lab Final Question

CSE 314

Fall 2020

Instructions:

- Write two programmes (one from each sets using the given procedure in instruction ii) in MATLAB/Octave.
- Match the serial number (S.N.) of questions from set A and set B with the last digit of your Roll number (UAP). For example, if your roll number is 22, you have to answer question no. 2 from both the sets.

S.N.	Set - A
1	Use forward divided difference approximation of the first derivative of $f(x) = 3e^{2.5x} + 2$ to calculate the derivative at $x_0=2.12$, x_1 , x_2 with a step size of 2. Print the FDD result and use plot function to display the values of x (i.e. x_0 , x_1 , x_2) and their corresponding values of y by x-axis and y-axis, respectively.
2	Use forward divided difference approximation of the first derivative of $f(x) = 6e^{-3x} + 3$ to calculate the derivative at $x_0=2.12$, x_1 , x_2 with a step size of 2. Print the FDD result and use plot function to display the values of x (i.e. x_0 , x_1 , x_2) and their corresponding values of y by x-axis and y-axis, respectively.
3	Use forward divided difference approximation of the first derivative of $f(x) = x^3 \ln(x)$ to calculate the derivative at $x_0=2.12$, x_1 , x_2 with a step size of 2. Print the FDD result and use plot function to display the values of x (i.e. x_0 , x_1 , x_2) and their corresponding values of y by x-axis and y-axis, respectively.
4	Use backward divided difference approximation of the first derivative of $f(x) = \sin^2 x$ to calculate the derivative at $x_0=2.12$, x_1 , x_2 with a step size of 2. Print the BDD result and use plot function to display the values of x (i.e. x_0 , x_1 , x_2) and their corresponding values of y by x-axis and y-axis, respectively.
5	Use backward divided difference approximation of the first derivative of $f(x) = 3e^{2.5x} + x^2$ to calculate the derivative at $x_0=2.12$, x_1 , x_2 with a step size of 2. Print the BDD result and use plot function to display the values of x (i.e. x_0 , x_1 , x_2) and their corresponding values of y by x-axis and y-axis, respectively.
6	Use backward divided difference approximation of the first derivative of $f(x) = 3e^{2.5x} + \sin x$ to calculate the derivative at $x_0=2.12$, x_1 , x_2 with a step size of 2. Print the BDD result and use plot function to display the values of x (i.e. x_0 , x_1 , x_2) and their corresponding values of y by x-axis and y-axis, respectively.
7	Use Central divided difference approximation of the first derivative of $f(x) = 3e^{2.5x} + 2$ to calculate the derivative at $x_0=2.12$, x_1 , x_2 with a step size of 2. Print the CDD result and use plot function to display the values of x (i.e. x_0 , x_1 , x_2) and their corresponding values of y by x-axis and y-axis, respectively.
8	Use Central divided difference approximation of the first derivative of $f(x) = x^3 \ln(x)$ to calculate the derivative at $x_0=2.12$, x_1 , x_2 with a step size of 2. Print the CDD result and use plot function to display the values of x (i.e. x_0 , x_1 , x_2) and their corresponding values of y by x-axis and y-axis, respectively.

9	Use Central divided difference approximation of the first derivative of $f(x) = 3e^{2.5x} + x^2$ to calculate the derivative at $x_0=2.12$, x_1 , x_2 with a step size of 2. Print the CDD result and use plot function to display the values of x (i.e. x_0 , x_1 , x_2) and their corresponding values of y by x-axis and y-axis, respectively.
0	Use Central divided difference approximation of the first derivative of $f(x) = 3e^{2.5x} + \sin x$ to calculate the derivative at $x_0=2.12$, x_1 , x_2 with a step size of 2. Print the CDD result and use plot function to display the values of x (i.e. x_0 , x_1 , x_2) and their corresponding values of y by x-axis and y-axis, respectively.

S.N.	Set - B
1	Use Newton-Raphson method to estimate the root of $x^4 - 4x^{3/2} + 5x + 2 = 0$. Conduct 10 iterations assuming that the root exists in the interval of $[4, 6]$. Show the result in a 10×4 matrix that contains 4 columns such as: Iteration No., Root (x_i), Absolute relative approximate error ($ \mathcal{E}_a $), and No. of significant digits.
2	Use Newton-Raphson method to estimate the root of $4x^3 + 7x + 3 = e^x$. Conduct 10 iterations with an initial guess 3. Show the result in a 10×4 matrix that contains 4 columns such as: Iteration No., Root (x_i), Absolute relative approximate error ($ \mathcal{E}_a $), and No. of significant digits.
3	Use Newton-Raphson method to estimate the root of $x^4 - 9x^{3/2} + 7x + 2 = 0$. Conduct 10 iterations assuming that the root exists in the interval of $[3, 4]$. Show the result in a 10×4 matrix that contains 4 columns such as: Iteration No., Root (x_i), Absolute relative approximate error ($ \mathcal{E}_a $), and No. of significant digits.
4	Use Newton-Raphson method to estimate the root of $e^x - 2x - 5 = 0$. Conduct 10 iterations with an initial guess -2. Show the result in a 10×4 matrix that contains 4 columns such as: Iteration No., Root (x_i), Absolute relative approximate error ($ \mathcal{E}_a $), and No. of significant digits.
5	Use Newton-Raphson method to estimate the root of $f(x) = x^{4/3} + x - 1$. Conduct 10 iterations assuming that the root exists in the interval of $[0.5, 1.0]$. Show the result in a 10×4 matrix that contains 4 columns such as: Iteration No., Root (x_i), Absolute relative approximate error ($ \mathcal{E}_a $), and No. of significant digits.
6	Use Newton-Raphson method to estimate the root of $f(x) = 2x^{0.5} + x^{0.5} - 5$. Conduct 10 iterations assuming that the root exists in the interval of $[4.5, 5.5]$. Show the result in a 10×4 matrix that contains 4 columns such as: Iteration No., Root (x_i), Absolute relative approximate error ($ \mathcal{E}_a $), and No. of significant digits.
7	Use Newton-Raphson method to estimate the root of $f(x) = x^3 - 7/(x+2)$. Conduct 10 iterations assuming that the root exists in the interval of $[1.4, 1.5]$. Show the result in a 10×4 matrix that contains 4 columns such as: Iteration No., Root (x_i), Absolute relative approximate error ($ \mathcal{E}_a $), and No. of significant digits.
8	Use Newton-Raphson method to estimate the root of $f(x) = 5\sin^2(x) - 8\cos^5(x)$. Conduct 10 iterations assuming that the root exists in the interval of $[0.5, 1.5]$. Show the result in a 10×4 matrix that contains 4 columns such as: Iteration No., Root (x_i), Absolute relative approximate error ($ \mathcal{E}_a $), and No. of significant digits.
9	Use Newton-Raphson method to estimate the root of $e^x - 3x^2 = 0$. Conduct 10 iterations assuming that the root exists in the interval of $[3, 5]$. Show the result in a 10×4 matrix

	that contains 4 columns such as: Iteration No., Root (x_i), Absolute relative approximate error ($ \mathcal{E}_a $), and No. of significant digits.
0	Use Newton-Raphson method to estimate the root of $\sin(x) - e^{-x} = 0$. Conduct 10 iterations assuming that the root exists in the interval of $[3, 4]$. Show the result in a 10×4 matrix that contains 4 columns such as: Iteration No., Root (x_i), Absolute relative approximate error ($ \mathcal{E}_a $), and No. of significant digits.