Lab Final Question

CSE 314

Spring 2020

Instructions:

i. Write two programmes (one from each sets using the given procedure in instruction ii) in MATLAB/Octave.
ii. Match the serial number (S.N.) of questions from set A and set B with the last digit of your Roll number (UAP) after adding 5 with it (roll no.). For example, if your roll number is 102, you have to add 5 with it, i.e. 102 + 5 = 107. Then you have to answer question no. 7 from both the sets (A and B).
iii. Do not copy equations from questions. Some mathematical signs may not work well.

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 also show the results in a 3×3 matrix that contains 3 columns such as: Serial No., x_value (x_i), and y_value (y_i).
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 also show the results in a 3×3 matrix that contains 3 columns such as: Serial No., x_value (x_i), and y_value (y_i).
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 also show the results in a 3×3 matrix that contains 3 columns such as: Serial No., x_value (x_i), and y_value (y_i).
4	Use backward divided difference approximation of the first derivative of $f(x) = sin^2x$ to calculate the derivative at x_0=2.12, x_1, x_2 with a step size of 2. Print the BDD result and also show the results in a 3×3 matrix that contains 3 columns such as: Serial No., x_value (x_i), and y_value (y_i).
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 also show the results in a 3×3 matrix that contains 3 columns such as: Serial No., x_value (x_i), and y_value (y_i).
6	Use backward divided difference approximation of the first derivative of $f(x) = 3e^{2.5x}+ sinx$ to calculate the derivative at x_0=2.12, x_1, x_2 with a step size of 2. Print the BDD result and also show the results in a 3×3 matrix that contains 3 columns such as: Serial No., x_value (x_i), and y_value (y_i).
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 also show the results in a 3×3 matrix that contains 3 columns such as: Serial No., x_value (x_i), and y_value (y_i).
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 also show the results in a 3×3 matrix that contains 3 columns such as: Serial No., x_value (x_i), and y_value (y_i).

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 also show the results in a 3×3 matrix that contains 3 columns such as: Serial No., x_value (x_i), and y_value (y_i).
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 results and also show the results in a 3×3 matrix that contains 3 columns such as: Serial No., x_value (x_i), and y_value (y_i).

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]. Print the result of Root (x_i), Absolute relative approximate error ($\|\varepsilon_a\|$), and No. of significant digits after each Iteration. Use plot function to display the values of x (i.e. $x_0, x_1, x_{2,\ldots} X_9$) and their corresponding values of y by x-axis and y-axis, respectively.
2	Use Newton-Raphson method to estimate the root of $4x^3+7x+3 = e^x$. Conduct 10 iterations with an initial guess 3. Print the result of Root (x_i), Absolute relative approximate error ($\|\varepsilon_a\|$), and No. of significant digits after each Iteration. Use plot function to display the values of x (i.e. $x_0, x_1, x_{2,\ldots} X_9$) and their corresponding values of y by x-axis and y-axis, respectively.
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]. Print the result of Root (x_i), Absolute relative approximate error ($\|\varepsilon_a\|$), and No. of significant digits after each Iteration. Use plot function to display the values of x (i.e. $x_0, x_1, x_{2,\ldots} X_9$) and their corresponding values of y by x-axis and y-axis, respectively.
4	Use Newton-Raphson method to estimate the root of $e^x-2x-5 = 0$. Conduct 10 iterations with an initial guess -2. Print the result of Root (x_i), Absolute relative approximate error ($\|\varepsilon_a\|$), and No. of significant digits after each Iteration. Use plot function to display the values of x (i.e. $x_0, x_1, x_{2,\ldots} X_9$) and their corresponding values of y by x-axis and y-axis, respectively.
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]. Print the result of Root (x_i), Absolute relative approximate error ($\|\varepsilon_a\|$), and No. of significant digits after each Iteration. Use plot function to display the values of x (i.e. $x_0, x_1, x_{2,\ldots} X_9$) and their corresponding values of y by x-axis and y-axis, respectively.
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]. Print the result of Root (x_i), Absolute relative approximate error ($\|\varepsilon_a\|$), and No. of significant digits after each Iteration. Use plot function to display the values of x (i.e. $x_0, x_1, x_{2,\ldots} X_9$) and their corresponding values of y by x-axis and y-axis, respectively.
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]. Print the result of Root (x_i), Absolute relative approximate error ($\|\varepsilon_a\|$), and No. of significant digits after

	each Iteration. Use plot function to display the values of *x* (i.e. x_0, x_1, $x_{2,....}$ X_9) and their corresponding values of *y* by x-axis and y-axis, respectively.
8	Use Newton-Raphson method to estimate the root of $f(x) = 5sin^2(x)-8cos^5(x)$. Conduct 10 iterations assuming that the root exists in the interval of [0.5, 1.5]. Print the result of Root (x_i), Absolute relative approximate error ($\lvert\varepsilon_a\rvert$), and No. of significant digits after each Iteration. Use plot function to display the values of *x* (i.e. x_0, x_1, $x_{2,....}$ X_9) and their corresponding values of *y* by x-axis and y-axis, respectively.
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]. Print the result of Root (x_i), Absolute relative approximate error ($\lvert\varepsilon_a\rvert$), and No. of significant digits after each Iteration. Use plot function to display the values of *x* (i.e. x_0, x_1, $x_{2,....}$ X_9) and their corresponding values of *y* by x-axis and y-axis, respectively.
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]. Print the result of Root (x_i), Absolute relative approximate error ($\lvert\varepsilon_a\rvert$), and No. of significant digits after each Iteration. Use plot function to display the values of *x* (i.e. x_0, x_1, $x_{2,....}$ X_9) and their corresponding values of *y* by x-axis and y-axis, respectively.