Military Institute of Science and Technology

Department of Computer Science & Engineering

Subject: Numerical Methods Sessional (**CSE 214)**

Date: 02nd Sep 2020

Problem:

1. Using Regula Falsi method, determine the drag co-efficient c, needed for a parachutist of mass m = 68.1 kg to have a velocity of 40 m/s after free falling for time t = 10 sec. The acceleration due to gravity is 9.8 m/s^2. Take user input as initial interval - proceed only if the interval is valid otherwise print a message "Not a valid interval". Iterate up to the approximate error falls below ε_a confirming to 7 significant figures & show the number of iteration required to find the root. Display the array of Root and Error. Also plot the graph for Error.

$$v(t) = \frac{gm}{c}\left(1 - e^{-\left(\frac{c}{m}\right)t}\right)$$

Input	Output
X0 = 0 X1= 1	Not a valid interval
X0 = 14 X1 = 16	I=6 X= 14.816 14.780 14.779 14.779 14.779 14.779 E= 2.4494e-01 7.4261e-03 2.2507e-04 6.8216e-06 2.0675e-07

USE OF MATLAB FUNCTION:

X0 = input ('1st Input:');

Problem:

2. Write programs to find the real root of the following equation by using **Newton Raphson** Method.

   a) $f(x) = x^6 - x^4 - x^3 - 1$; correct to 6 decimal point near x = 1.5 & -1.
   [Print the values of Root up to 6 decimal point]

   b) Solve 2(a) using **roots, fzero, fsolve** Matlab function.

Input	**Output**
X0 = 1.5	Roots: x = 1.422840 1.404540 1.403604 1.403602 1.403602 Error: e = 1.3029e+00 6.6671e-02 1.6785e-04 1.0616e-09 Using Roots Function: R = 1.40360 + 0.00000i -1.00000 + 0.00000i -0.65678 + 0.83759i -0.65678 - 0.83759i 0.45498 + 0.64950i 0.45498 - 0.64950i Using Fzero Function: Z = 1.4036 Using Fsolve Function: S = 1.4036
X0 = -1	Roots: x = -1.000000 -1.000000 Error: e = 0 Using Roots Function: R = 1.40360 + 0.00000i -1.00000 + 0.00000i -0.65678 + 0.83759i -0.65678 - 0.83759i 0.45498 + 0.64950i 0.45498 - 0.64950i Using Fzero Function: Z = -1.0000 Using Fsolve Function: S = -1.0000

*** Also solve both problems manually correcting up to 2 decimal point***