CH2013: Computational Programming and Simulations Lab
July-Nov 2023
Problem Sheet #3a

28 August 2023 Wednesday

1) **[For evaluation]** The temperature of a well mixed reactor is given by the roots of the equation

$$x = \delta e^{x}$$

   a) Use Regula Falsi method to solve for x for δ = 0.2. Here δ represents the heat of reaction. **[Grader]**
   b) Use Regula Falsi method to solve for x for δ = 4. Here δ represents the heat of reaction. If you can't solve, report first 8 iterations having initial guess as x0 = [0 1]. **[Grader]**
   c) Plot the LHS and RHS as a function of x for x for δ = 0.2 and δ = 4. Comment on your results in (1a & b) **[Grader]**

   Instructions on variable name for the solution, tolerance etc.., are given in Mathlab Grader

2) **[For evaluation]** Consider the following equation

$$f(x) = x - \delta\, e^{\left(\frac{x}{1+\varepsilon x}\right)}$$

   Here x is the temperature of a 0^{th} order reaction, δ = 0.525 is the heat of reaction and ε = 0.243 is the activation energy.

   a) Plot the above equation from x = 1 to x = 8. **[Grader]**
   b) How may roots does this equation have? **[Grader]**
   c) Use fixed point iteration method with different initial guesses to get the roots. **[Grader]**