Instructions

- Make a document (either in .doc and .pdf) containing code, results. Named the file using both of your Roll nos. *i.e.* 140100001_140100002
- Write Up: (i) Software in which code is written, (ii) output results for each case, and (iii) explanation of results.
- Please upload all assignments to turnitin

Assignment 6
Due date: 23/10/2017, time: 12 midnight
Solution of Ordinary Differential Equation

Question: 1

Write a program to solve the following ODE using (i) Euler Method, (ii) Modified Euler Method and (iii) Trapezoidal Method.

1. $\frac{dy}{dx} = \log(x + y)$. At $y(0)$ =2., at x=1.2 and x=1.4 with h=0.2

For both Backward Euler and Trapezoidal Methods, the code should solve the implicit equation iteratively for $y_{(n+1)}$. The first guess for both cases should be the one predicted using forward Euler method.

In code, there should be an option of choosing number of iterations.

I. For n =0, the code should iterate till the solution converges. The convergence criterion can be chosen as 10^{-6}.
II. For n=1, it will be a simple predictor-corrector scheme.
III. For n =10, only 10 iterations will be computed.
IV. Use the following values of h: (i) 10^{-4}, (ii) 10^{-3} and (iii) 10^{-2}.
V. Carry out solution till x = 5

Results to report:

The following graphs should be plotted:

1. Solutions obtained from forward Euler, backward Euler (converged), trapezoidal (converged).
2. Plot the variation of residual with iterations
3. In each case, and for each h: Compare Backward Euler and Trapezoidal methods with different values of n.