******** **Assignment-8** ********

1. Solve:
$$\frac{dy}{dx} = x + y; \quad y(0) = 1,$$
by Euler method, Bacward Euler method and Modified Euler method. Given step length $h = 0.1$ and $x \in [0, 1]$. Calculate error at each step. Then reduce the step length to $h = 0.05$. Give your remarks about the errors. Plot the errors with different values of h.

2. Repeat the exercise for the following probelm:
$$\frac{dy}{dx} = xy + y^2, \qquad y(0) = 1,$$

********** **Assignment-9** **********

3. Solve the following problem: $; y' = y + 3t - t^2 \quad y(0) = 1$, by by improved tangent, Heun's and Optimal method. Given step length $h = 0.1$ and $x \in [0, 1]$. Calculate error at each step. Then reduce the step length to $h = 0.05$. Give your remarks about the errors. Plot the errors with different values of h.

4. Given the initial value problem, $y' = x(y - x)$, $y(2) = 3$, compute $y(2.6)$ by using Runge-Kutta methods of order 2 (mentioned above) with diffetent step lengths $h = 0.01$, $h = 0.02$, $h = 0.03$. Find out the error at each step. Plot the error along with the exact and numerical solution.

5. Solve the above problem No: 3 and 4 with Euler methods (both forward and backward), Modified Euler method. Compare the errors at each step for each value of the step length and print the output in shape of a table.

********** **Assignment-10** **********

6. Find $y(0.5)$ by using Runge-Kutta method of order 4:
$$\frac{dy}{dx} = xy + y^2, \qquad y(0) = 1,$$
where the step length $h = 0.05$. Calculate error at each step. Then reduce the step length to $h = 0.025$. Give your remarks about the errors. Plot the solution and errors with different values of h.

7. Computationally find the order of convergence. Display/ Provide the results in shape of a table as informed earlier.

******* End *******