

CS 3513 - Numerical Analysis

Homework #10 - 2006.11.15

Due Date - 2006.11.20

Name: _____

1. Consider the initial value problem

$$\begin{cases} y' = 2(t+1)y \\ y(0) = 1 \\ y \in [0, 1]. \end{cases}$$

a) What is the Lipschitz constant L for the rectangle $S = [0, 1] \times \mathbb{R}$?

b) Solve the IVP by either separation of variables or by the method of integrating factors.

c) Use Euler's Method with $h = 0.01$ to numerically compute the solution to the IVP. Plot both the actual solution and the Euler's Method solution on the same graph.

d) Numerically compute the global error by plotting the difference between the actual solution found in part b) and the Euler's Method solution found in part c).

e) Find the error bound algebraically for Euler's Method applied to the IVP problem. How close does the actual error come to the error bound?

2. Repeat problem 1 except this time, use the IVP

$$\begin{cases} y' = t^2 y \\ y(0) = 1 \\ y \in [0, 1]. \end{cases}$$