

Math 304: Problem Set 7

Due: April 27, 2009

- Chapter 7

- Chapter 7 deals with numerical approximations to differential equations. Update the program `eulers.m` to implement *Improved Euler's Method*. An outline for this method can be found on page 644. Compare your method with the provided `eulers.m` and Matlab's built in function `ode23` on the function

$$\frac{dy}{dt} = -2ty^2, \quad y(0) = 1$$

for $\Delta t = 0.1$ from $0 \leq t \leq 2$. Make a plot comparing each of the methods and analyze your results. Recall, that you can run `eulers.m` by typing

```
>> [te, ye]=eulers(@fun,0,2,1, .1);
```

at the prompt.

Note: You can check your code by comparing it with table 7.1. Only the first four iterations should match due to round-off errors.

- Make a plot comparing each of the methods on the function

$$\frac{dy}{dt} = 2y + 1, \quad y(0) = 0$$

for $\Delta t = 0.2$ from $0 \leq t \leq 5$. Analyze your results.

- Section 8.1: 1, 3, 7, 9, 11, 23
- Section 8.2: 1, 3, 13
- Section 8.3: 1, 3, 9