

Differential Equations

Homework Two

Due 25 April 2008

1. Chapter 4, problem 1.
2. Consider the following IVP:

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

- (a) Solve this equation analytically.
 - (b) Approximate the solution to this equation using Euler's method on the interval $0 \leq t \leq 2$. Do this two ways:
 - i. Using $\Delta t = 0.5$
 - ii. Using $\Delta t = 0.25$
 - (c) Make a table comparing your approximate results with the exact solution.
 - (d) Make a plot the approximate solutions and the exact solution on the same axes.
 - (e) Suppose you needed an estimate of $y(2)$ that was accurate to three decimal places. Approximately what Δt would you choose? Why?
3. Chapter 3, problem 4.
 4. Chapter 3, problem 6.
 5. Chapter 3, problem 13 (optional).