

MAT – 112: Calculus I and Modeling

Homework 9

Instructor: Thomas R. Cameron

Due: 4/27/2018

Instructions

You must complete all book problems and other problems. The book problems are intended to give you practice in solving problems from the textbook. They are graded based upon completion and correctness. The other problems are intended to help further your understanding of the concepts from a theoretical point of view. These problems are more rigorously graded, with a high expectation on the student providing clear, detailed, and justified answers. Lastly, you may work with other students and ask me any questions, but you may not look up solutions online. You must write your solutions independently so I may interpret your understanding while grading.

Book Problems

§7.4: 26, 30, 49, 55

§8.3: 12, 34, 36, 42

Other Problems

Problem 1. Use the left-hand rectangle method and trapezoidal method for approximating an integral to derive Euler’s method and the “trapezoidal method” for approximating the differential equation

$$\frac{dy}{dt} = f(t, y), \quad y(t_0) = y_0,$$

with a step size of h .

Problem 2. Use both Euler’s method and the midpoint method to approximate the particular solution of the differential equation

$$\frac{dy}{dx} = \frac{6y + e^x}{2}, \quad y(0) = 5,$$

which has an exact solution of $y(x) = -\frac{e^x}{4} + \frac{21}{4}e^{3x}$. Use an Excel spreadsheet to keep track of you approximate solutions and the exact solution for step size of $h = 1/2$ on the interval $[0, 3]$. See the Excel spreadsheet that was handed out on Friday 4/20 for guidance. Provide a printed copy of your spreadsheet when you turn in your homework.