AMSC/CMSC 660 Quiz 7 , Fall 2004

Show all work. You may leave arithmetic expressions in any form that a calculator could evaluate. By putting your name on this paper, you agree to abide by the university's code of academic integrity in completing the quiz. Use no books, calculators, cellphones, other electronic devices, communication with others, scratchpaper, etc.

Name _____

1. (10) Suppose that you have developed an ode model that predicts the amount of profit that you will receive on December 11 if you invest \$1000 today in various components of your business, and that profit depends on 5 parameters $x_1, \ldots, x_5$, so that

$$\begin{aligned} y'(t) &= f(t, y, x), \\ y(0) &= 0, \\ y(1) &= \text{profit on December 11, using parameters } x. \end{aligned}$$

You want to choose those 5 parameters in x to maximize $y(1)$ (which is a scalar value). (Then you will take the money and run.)

What numerical algorithms would you use to solve your problem and how would they pass information to each other? Why did you choose these particular algorithms?

2. (10) Let

$$\begin{aligned} y' &= y^2 - 5t \\ y(0) &= 1 \end{aligned}$$

Apply a PECE scheme to this problem, using Euler and Backward Euler with a stepsize $h = .1$, to obtain an approximation for $y(.2)$.