

Third Exam

Friday, November 2, 2007

This exam is closed book. Make sure your name is on all pages. Show all work, and show it in a logical and organized manner. Each part of each problem is worth 20 points.

1. Consider the initial value problem

$$y' = y^2, \quad y(0) = 1.$$

- (a) Do four steps of Euler's method with step size $h = 0.25$ to obtain an approximate value for $y(1)$. Carry at least two digits after the decimal point.
- (b) Solve the initial value problem exactly, and evaluate your expression for $y(.75)$ and $y(1)$ with your calculator.
- (c) Compare the results from part 1a and part 1b. In particular, is the result from part 1a less than or greater than the result from part 1b, and can you explain why this is so?

2. Solve the following initial value problem.

$$y'' + 5y' + 4y = 0, \quad y(0) = 1, \quad y'(0) = 0.$$

3. Find the general solution to the following differential equation.

$$y'' + 5y' + 4y = \sin(t).$$