

**Sample Exam 2**  
**Math 341 - Fall 2002**  
**Prof. John A. Pelesko**

This is a practice test for exam #2 of the Fall 2002 semester. Be forewarned, this is a sample only, it is not meant to offer a complete review of the material you must master for the exam. That is, while you should be able to solve all problems on this exam, your ability to solve problems should not be limited to those on this exam.

(1) (15 Points) Consider the initial value problem

$$y' = 3 + t - y, \quad y(0) = 1.$$

Using Euler's method with a step size  $h = 0.1$  compute an approximate value of  $y$  at  $t = 0.1$ .

(2) (20 Points) Solve the initial value problem

$$4y'' + 4y' + y = 0, \quad y(0) = 1, \quad y'(0) = 2.$$

(3) (25 Points) Find the general solution of

$$y'' - 2y' + y = te^t + 4$$

(4) (20 Points) Consider the equation

$$y'' + by' + 4y = 0$$

where  $b$  is a constant. Describe the behavior of solutions for all  $b$ . (Hint: Your answer should be something like, "When  $b$  is between such and such, solutions are purely exponential, when  $b$  is ...")

(5) (20 Points) If  $a, b$  and  $c$  are positive constants prove that all solutions of

$$ay'' + by' + cy = 0$$

approach zero as time tends to infinity.