Math 333
Quiz 5
Thursday, February 21, 2008

1. Find the general solution of the differential equation

$$y'' + 2y' - 3y = 0.$$

2. Determine the values of α, if any, for which all solutions of the differential equation

$$y'' - (2\alpha - 1)y' + \alpha(\alpha - 1)y = 0$$

tend to zero as $t \to \infty$.

3. Determine the longest interval in which the initial-value problem

$$t(t-4)y'' + 3ty' + 4y = 0, \quad y(3) = 0, \quad y'(3) = -1$$

is guaranteed to have a unique solution.

4. Show that
$$y_1(x) = x \text{ and } y_2(x) = \sin x$$
form a fundamental set of solutions for the differential equation
$$\left(1 - x\frac{\cos x}{\sin x}\right)y'' - xy' + y = 0, \quad 0 < x < \pi.$$
Find the general solution of the differential equation.