

1. Show work on these sheets.

2. Do not submit extra sheets.

3. Box answers.

Math 254 Quiz 3

October 21, 1997

Name \_\_\_\_\_

(10 pts) 1.) Show that the functions  $y_1 = 2x$ ,  $y_2 = x^2 + x$ , and  $y_3 = 7x - 4x^2$  are linearly dependent.

(15 pts.) 2.) Verify that the functions  $1$ ,  $x$ , and  $x^3$  form a fundamental set of solutions to the differential equation  $xy''' - y'' = 0$  on  $(0, \infty)$ .

(15 pts.) 3.) Given that  $y = c_1 \cos \frac{3x}{2} + c_2 \sin \frac{3x}{2}$  is a two parameter family of solutions of

$4y'' + 9y = 0$  on  $(-\infty, \infty)$ , find a solution such that  $y(\frac{\pi}{2}) = 0$  and  $y(\frac{\pi}{3}) = 4$ .

Does Theorem 4.1 (Existence of a Unique Solution Theorem) guarantee that this is the only solution? Why or why not?

4.)

(12 pts.) (a.) Form the general solution of  $y''' - 27y = 0$ .

(16 pts.) (b.) Solve  $4y'' - 12y' + 9y = 0$  subject to  $y(0) = 4$  and  $y'(0) = 7$ .

(16 pts.) (c.) If  $y_1 = e^{2x} \sin 3x$  is a solutions of  $y''' - 5y'' + 17y' - 13y = 0$ , what is the general solution of this differential equation?

(16 pts) 5.) Solve  $y'' - y' - 2y = 3xe^x$  by undetermined coefficients.