

Name: _____

Score: _____

Instructions: You must show supporting work to receive full and partial credits. No text book, notes, formula sheets allowed.

1(10pts) Solve the initial value problem $a(x)y'' + b(x)y' + c(x)y = 0, y(0) = 1, y'(0) = 2$ when $y_1(x) = e^{2x}, y_2(x) = x + 1$ are given as two solutions of the homogenous equation.

2(15pts) The linear differential equation of constant coefficients $a_3y^{(3)} + a_2y'' + a_1y' + a_0y = e \cos(2x) + 3xe^{-2x}$ has $r = 2, \pm 2i$ as the roots of its characteristic equation. Find a **FORM** for a particular solution to the nonhomogeneous equation.

3(20pts) Find a general solution to the equation $y''' - 6y'' + 11y' - 6y = 0$.

4(15pts) One solution $y_1(x) = x$ is given for the differential equation $x^2y'' - 2xy' + 2y = 0$. Use the method of reduction of order to find a second, linearly independent solution.

5(20pts) Use the method of undetermined coefficients to find a particular solution to the equation $y''' + 2y' = 2 + 4x$.

6(20pts) Use the method of variation of parameters to find a particular solution to the equation $(x^2 - 1)y'' - 2xy' + 2y = (x^2 - 1)^2$ given that $y_1(x) = x, y_2(x) = 1 + x^2$ are solutions to the homogeneous equation.

END