

Name: _____ ID Number: _____

MTH Makeup

Exam 2

October 8-10, 2008

No calculators or any other devices are allowed on this exam.

Read each question carefully. If any question is not clear, ask for clarification.

Write your solutions clearly and legibly; no credit will be given for illegible solutions.

Answer each question completely, and show all your work.

- 1.** (20 points) Find the solution $y(x)$ to the initial value problem

$$y'' - 2y' + 10y = 0, \quad y(0) = 1, \quad y'(0) = 2.$$

#	Score
1	
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- 2.** (20 points) Use the method of reduction of order to find a second solution $y_2(x)$ of the differential equation

$$x^2 y'' + 2x y' - 2y = 0, \quad x > 0,$$

knowing that a solution of the above equation is $y_1(x) = x$.

- 3.** (20 points) Use the method of undetermined coefficients to find a particular solution $y(x)$ to the inhomogeneous equation

$$y'' - 2y' + y = xe^{2x} + 4.$$

4. (20 points) Find the **recurrence relation** for the coefficients a_n of the power series expansion $y(x) = \sum_{n=0}^{\infty} a_n (x - x_0)^n$ centered at $x_0 = 0$ of the solution of the differential equation

$$(2 + x^2) y'' - x y' + 4y = 0.$$

You do not need to solve the recurrence relation.

5. (20 points) Find the general solution $y(x)$ of the Euler equation

$$(x - 1)^2 y'' + 8(x - 1) y' + 12y = 0.$$