EXAM

Exam 2

Math 3350, Summer II, 2013

July 1, 2016

- Write all of your answers on separate sheets of paper. Do not write on the exam handout. You can keep the exam questions when you leave. You may leave when finished.
- You **must** show enough work to justify your answers. Unless otherwise instructed, give exact answers, not approximations (e.g., $\sqrt{2}$, not 1.414).
- This exam has 6 problems. There are **320 points total**.

Good luck!

80 pts.

Problem 1. In each part, find the general solution of the differential equation, or solve the initial value problem.

A.

$$y'' + 3y' + 2y = 0, \qquad y(0) = 1, \quad y'(0) = 2.$$

B.

$$y'' + 6y' + 9y = 0.$$

C.

$$y'' + 4y' + 29y = 0.$$

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40 pts.

Problem 2. In each part, find the general solution.

A.

$$D^2(D-2)(D-3)^3 y = 0$$

B.

$$(D+1)(D^2 - 4D + 5)^3 y = 0$$

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60 pts.

Problem 3. Find the general solution of the Euler-Cauchy equation.

A.

$$x^2 y'' - 2xy' + 2y = 0$$

B.

$$x^2 y'' - 5xy' + 9y = 0.$$

C.

$$x^2 y'' + 5xy' + 29y = 0.$$

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60 pts.

Problem 4. **Use the method of Undetermined Coefficients** to find the general solution. You can use the book's method or the shifting rule method, it's up to you.

A.

$$y'' - 2y' + y = x$$

B.

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

C.

$$y'' - 2y' + y = e^{x}$$

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40 pts.

Problem 5. Use Shifting Rule version of the method of undetermined coefficients to find the general solution of the given equation. No credit for using any other method (including the book's version of undetermined coefficients).

$$(D^2 - D - 2)y = 27x^2e^{2x}$$

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40 pts.

Problem 6. Find the general solution **by the method of variation of parameters.**

A.

$$y'' - 2y' + y = \frac{e^x}{x^3}$$

B.

$$x^2y'' + 2xy' - 6y = x^2$$

You may assume the general solution of the homogenous equation is $y = C_1x^2 + C_2/x^3$.
