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EXAM

Exam 2, Version 1

Math 3350, Spring 2017

Feb. 28, 2017

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- 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 4 problems. There are **190 points total**.

Good luck!

50 pts.

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

A.

$$y'' - y' - 2y = 0, \qquad y(0) = 1, \quad y'(0) = 0$$

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

C.
$$y'' + 2y' + 5y = 0$$

D.
$$x^2 y'' - 3xy' + 4y = 0$$

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40 pts.

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

A.
$$D^2(D+1)(D-2)^3 y = 0$$

B.
$$(D+3)(D^2 - 2D + 10)^3 y = 0$$

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60 pts.

Problem 3. Use the method of Undetermined Coefficients (either version) to find the general solution

A.
$$y'' + y' - 2y = 2x^2 + 2x$$

B.
$$y'' + y' - 2y = 5\cos(x)$$

C.
$$y'' + y' - 2y = e^x$$

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40 pts.

Problem 4. Find the general solution of the following differential equations, **using the method of variation of parameters**.

A.

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

B.

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

In this part of the problem, you can assume the fundamental solutions of the homogeneous equation are $y_1 = x$ and $y_2 = x^2$.