

# Differential Equations Homework 8

Due October 24

## Instructions

1. Write down the names of the people you worked with.
2. Write down any resources you used other than ones that most of your classmates would be familiar with, such as Wikipedia or Wolfram Alpha.
3. Write down at the top of your submission for part 1, separately, the number of hours it took you to complete this hand-graded assignment, and the number of hours it took you to complete the corresponding Webwork.
4. Write your name, Math 217, and the homework number.
5. Hand in your homework in class.
6. You'll be handing in your solutions to parts 1, 2, and 3 to separate piles to go to separate graders. Make sure they're on separate sheets of paper.
7. Unless directed otherwise, show enough work to convince a classmate that disagrees with you that you're right and they're wrong. Answers alone will usually receive no credit.

## Problems

### Part 1

1. Do problem 3.2.24 on page 159.
2. Do problem 3.2.26 on page 159.
3. Do problem 3.2.30 on page 159.
4. Do problem 3.2.31 on page 159.

## Part 2

5. Let

$$L = (D - 1)(D - 2)(D - 3)(D - 4)(D - 5).$$

(a) Compute the functions

$$L(e^x), \quad L(e^{2x}), \quad L(e^{3x}), \quad L(e^{4x}), \quad L(e^{5x}), \quad L(e^{6x}).$$

(b) Write down the general solution to the homogeneous linear differential equation with constant coefficients

$$Ly = 0.$$

6. (a) Write down a homogeneous linear differential equation with constant coefficients of the lowest possible order so that

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

is one of its solutions.

(b) Write down the general solution to your equation, and note which values of the constants gives the solution  $y = xe^{2x} + x^2e^{-x}$  above.

## Part 3

7. (a) Do problem 3.3.51 on page 171. If you did computations in homework 7 that are relevant, you don't have to rewrite those computations, but you do need to rewrite the results of those computations that you'd like to cite. As in any discipline, clearly write down what you're citing, where it's coming from, and its relevance to your current work.

(b) Do problem 3.3.57 on page 172.

(c) Do problem 3.3.58 on page 172.