

Math 246, Professor David Levermore
Group Work Exercises for Discussion
Wednesday, 14 October 2020

Set A of Group Work Exercises [4]

Consider the differential equation

$$y'' + 4y' + 29y = 7t^3 e^{-2t} \cos(5t).$$

Suppose that you plan to find a particular solution of this equation by the methods of Chapter 6. The reasoning behind your answers should be made clear.

- A.1. The forcing has characteristic form. Give its degree, characteristic, and multiplicity.
- A.2. Write down the Key Identity and its derivatives with respect to z up to the order needed for the Key Identity Evaluation method. (You do not need to evaluate these at the characteristic.)
- A.3. Write down the form for the particular solution needed to start the Undetermined Coefficients method. (You do not need to plug this form into the differential equation.)
- A.4. Use the Green Function method with initial time 0 to express a particular solution in terms of two definite integrals that do not have t in their integrands. (You do not need to evaluate these integrals.)

Exercises A.2 and A.3 depend upon A.1. Exercise A.4 is decoupled from the others.

Set B of Group Work Exercises [3]

Find a particular real solution for each of the following equations. The reasoning behind your answers should be made clear.

- B.1. $\ddot{x} + 4\dot{x} + 29x = 10e^{3t}$.
- B.2. $u'' + 10u' + 169u = 50 \cos(3t)$.
- B.3. $v'''' + 13v'' + 36v = 10 \cos(2t)$.

These exercises are decoupled.

Set C of Group Work Exercises [3]

Find a particular real solution for each of the following equations. The reasoning behind your answers should be made clear.

- C.1. $\ddot{h} + 4\dot{h} + 29h = 10t e^{3t}$.
- C.2. $w'' - 4w = 8t e^{2t}$.
- C.3. $\ddot{y} + 4y = t \sin(2t) + \cos(2t)$.

These exercises are decoupled.