

Math 3413.001: Physical Mathematics I

Homework 4, due February 18 (Tuesday)

Lecture 7 (Feb 4) - Due date 02/18/2020 : Section 3.3

1. Find the general solution of the differential equation
 - (a) $y'' - 2y' + 4y = 0$.
 - (b) $y''' + 8y = 0$.
 - (c) $y^{(4)} - 81y = 0$.
2. Find the general solution of the linear homogeneous differential equation with constant coefficients whose characteristic equation factors as follows.

$$r^3(r+3)^2(r^2+9)^2(r-5)(r^2-2r+4) = 0.$$

3. Suppose

$$y(x) = c_1 + c_2x + (c_3 + c_4x)e^x + (c_5 \cos(2x) + c_6 \sin(2x)) + x((c_7 \cos(2x) + c_8 \sin(2x)))$$

is a solution to a linear homogeneous differential equation with constant coefficients. Find the differential equation.

Suggested problems from the book (DO NOT SUBMIT): Pg 170-172, #12, 15, 18, 29, 34, 40

Lecture 8 (Feb 6) - Due date 02/13/2020 : Section 3.5

1. Find the general solution of the differential equation
 - (a) $y'' - y = x^2 - 3x$.
 - (b) $y'' - y' = x^2 - 3x$.
2. Find the general solution of the differential equation
 - (a) $y'' + y = \sin(2x)$.
 - (b) $y'' + y = \sin(x)$.
3. Determine the appropriate form of the particular solution (Do not solve for the constants)

$$y^{(4)} - 4y''' + 5y'' = 5x^3 + 7 + e^{-x} + 2e^x \sin(x).$$

Suggested problems from the book (DO NOT SUBMIT): Pg 195-196, #2, 10, 22, 28, 31, 38