

# MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

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ASSIGNMENT 6

MATH 2260

SPRING 2019

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**Due: Wednesday, July 24th, 2019 at 1:00pm. SHOW ALL WORK.**

1. Solve each of the following higher-order equations.

(a)  $\frac{d^4y}{dt^4} + 4\frac{d^3y}{dt^3} + 13\frac{d^2y}{dt^2} + 36\frac{dy}{dt} + 36y = 0$

(b)  $4\frac{d^4y}{dt^4} - 13\frac{d^3y}{dt^3} + 15\frac{d^2y}{dt^2} - 7\frac{dy}{dt} + y = 0$

(c)  $\frac{d^3y}{dt^3} + \frac{d^2y}{dt^2} - 6\frac{dy}{dt} = 0, \quad y(0) = 0, \quad y'(0) = 9, \quad y''(0) = 33$

2. Use the method of undetermined coefficients to find the general solution of each of the following equations. (Note that each of the corresponding homogeneous equations was solved on Assignment 5; you do not have to derive those results again.)

(a)  $\frac{d^2y}{dt^2} - 8\frac{dy}{dt} + 15y = 5\sin(5t)$

(b)  $\frac{d^2y}{dt^2} + 8\frac{dy}{dt} + 16y = 64t^3$

(c)  $\frac{d^2y}{dt^2} - 2\frac{dy}{dt} + 5y = 16te^{-t}$

(d)  $9\frac{d^2y}{dt^2} + y = \sin\left(\frac{t}{3}\right)$

(e)  $4\frac{d^2y}{dt^2} - 28\frac{dy}{dt} + 49y = e^{\frac{7t}{2}}$

3. Use the method of undetermined coefficients to solve the equation

$$\frac{d^4y}{dt^4} + 4\frac{d^3y}{dt^3} - 5\frac{d^2y}{dt^2} = 18e^t - 10.$$