

**2023-24 First Semester**  
**MATH2023 Ordinary and Partial Differential Equations (1002)**

Assignment 6

Due Date: **9/Nov/2023(Thursday), on or before 16:00, in tutorial.**

- Write down your **CHN name** and **student ID**. Write neatly on **A4-sized** paper (*staple if necessary*) and **show your steps**.
  - **Late submissions or answers without details will not be graded.**
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1. Determine the **form** of a particular solution to the following non-homogeneous equations, **do not attempt to solve them**.

- (a)  $y''' - 2y'' + y' = t^3 + 2e^t$ .
- (b)  $y^{(4)} + 4y'' = te^t + \cos 2t + t$ .
- (c)  $y^{(4)} + 2y''' + 2y'' = 3e^t + 2te^{-t} + e^{-t} \sin t$ .
- (d)  $y''' - 3y'' + y' + 5y = xe^{-x} + x^2e^{2x} \sin x$ .

2. Solve for the general solution of

(a)

$$y''' + y' = \sec t, \quad -\pi/2 < t < \pi/2.$$

(b)

$$y''' - 3y'' + 3y' - y = t^{-2}e^t$$

3. Find out a particular solution to

$$y''' - 2y'' + y' = t^3 + 2e^t.$$

- (a) by the method of undetermined coefficients.
- (b) by variation of parameter.
- (c) by reduction of order.

4. Solve the given initial value problem

$$y''' - 2y'' + y' = xe^x + 5, \quad y(0) = 2, \quad y'(0) = 2, \quad y''(0) = -1.$$

5. Given that functions  $y_1$  is a solution to the corresponding homogeneous equation, find a particular solution of the given nonhomogeneous equation.

$$x^3y''' + x^2y'' - 2xy' + 2y = 2x^4, \quad x > 0, \quad y_1(x) = x$$