Tutorial Sheet: MA 5023 - 23-November-2020

Indian Institute of Technology Tirupati

Department of Mathematics and Statistics

MA5023 – Differential Equations for Engineers – Tutorial Sheet

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Problem 1: Find the particular solution of the following ODE using **Green's function**

a) $y'' - y = f(x)$ $(c) y'' - y = \frac{1}{x}, y(1) = 0, y'(1) = 0$

b) $y'' - y = e^{2x}, y(0) = 0, y'(0) = 0$ (d) $y'' + 4y = x, y(0) = 0, y'(0) = 0$

Problem 2: Find the radius and interval of convergence of the following **power series**

$$(a) \sum_{m=0}^{\infty} (m+1)mx^m \quad (b) \sum_{m=0}^{\infty} x^m$$

Problem 3: Find the power series solution for the following ODEs

a) $y' + y = 0$ (b) $y' - 5y = 0$

Problem 4: Identity ordinary, singular, regular singular and irregular singular points for the following ODEs.

a) $(x^2 - 4)^2 y'' + 3(x-2)y' + 5y = 0$ (b)$3xy'' + y' - y = 0$

Problem 5: Use the **Frobenius method** to find two independent solutions for the following ODE

a) $x(x-1)y'' + (3x-1)y' + y = 0$ (b) $(x^2 - x)y'' - xy' + y = 0$