

110-1 ENGINEERING MATHEMATICS HW3

Due Date: 2022/1/3 18:00

Part I: Rewrite the given expression as a single power series whose general term involves x^k

1. $\sum_{n=1}^{\infty} 2nC_n x^{n-1} + \sum_{n=0}^{\infty} 6C_n x^{n+1}$

Part II: Find two power series solutions of the given differential equation about the ordinary point $x = 0$

2. $y'' - 2xy' + y = 0$

Part III: $x = 0$ is a regular singular point of the given differential equation. Show that the indicial roots of the singularity do not differ by an integer. Use the method of Frobenius to obtain two linearly independent series solutions about $x = 0$. Form the general solution on the interval $(0, \infty)$

3. $2xy'' - y' + 2y = 0$

Part IV:: Use the indicated change of variable to find the general solution of the given differential equation on the interval $(0, \infty)$

(需將 $J_\nu(x)$ 完整寫出)

4. $x^2 y'' + 2xy' + a^2 x^2 y = 0; y = x^{-\frac{1}{2}} u(x)$