

Introduction to Differential Equations

Assignment # 4

Date Given: May 2, 2022

Date Due: May 9, 2022

- P1.** (1 point) Find the general solution of the differential equation $y'' + 5y' = 0$.
- P2.** (2 points) Find the solution of the initial value problem $y'' + 4y' + 3y = 0$, $y(0) = 2$, $y'(0) = -1$. Sketch the graph of the solution and describe its behavior as t increases.
- P3.** (1 point) Find a differential equation whose general solution is $y = c_1e^{2t} + c_2e^{-3t}$.
- P4.** (2 points) Determine the values of α , if any, for which all solutions of the differential equation $y'' + (3 - \alpha)y' - 2(\alpha - 1)y = 0$ tend to zero as $t \rightarrow \infty$; also determine the values of α , if any, for which all (nonzero) solutions become unbounded as $t \rightarrow \infty$.
- P5.** (2 points) Verify that the functions $y_1(x) = x$ and $y_2(x) = xe^x$ are solutions of the differential equation $x^2y'' - x(x+2)y' + (x+2)y = 0$, $x > 0$. Do they constitute a fundamental set of solutions?
- P6.** (2 points) If the differential equation $ty'' + 2y' + te^ty = 0$ has y_1 and y_2 as a fundamental set of solutions and if $W(y_1, y_2) = 2$ at $t = 1$, find the value of $W(y_1, y_2)$ at $t = 5$.