

Each group only needs to submit ONE file containing your solutions!

Problem 1. Consider the ODE

$$y'' - 4y' + 3y = 0$$

(1) Look for solutions of the form $Y(t) = e^{\lambda t}$ where λ is a constant. You should be able to get two such solutions $Y_1(t), Y_2(t)$.

(2) Check that $Y_1(t), Y_2(t)$ you obtained from (1) are a fundamental set of solutions.

(3) Verify the correctness of the Abel's Wronskian Theorem for $Y_1(t), Y_2(t)$.

(4) Use $Y_1(t), Y_2(t)$ to solve the initial value problem with initial condition

$$y(0) = 2, \quad y'(0) = -1$$

Problem 2. Consider the ODE

$$y'' + y = 0$$

(1) Look for solutions of the form $Y(t) = e^{\lambda t}$ where λ is a constant (possibly complex numbers). You should be able to get two such solutions $Y_1(t), Y_2(t)$.

(2) Check that $Y_1(t), Y_2(t)$ you obtained from (1) are a fundamental set of solutions.

(3) Verify the correctness of the Abel's Wronskian Theorem for $Y_1(t), Y_2(t)$.

(4) Use $Y_1(t), Y_2(t)$ to solve the initial value problem with initial condition

$$y(0) = 2, \quad y'(0) = -1$$

Express your final answers using trigonometric functions instead of complex exponentials (recall $e^{it} = \cos t + i \sin t$, $i = \sqrt{-1}$)

(5) Find a fundamental set of solutions which are real valued functions.