1. Solve the initial value problem \( y'' - 5y' + 4y = 0, \quad y(0) = 2, \quad y'(0) = -3. \)

2. Consider the initial value problem \( t^2 y'' - 2y = 0, \quad y(-1) = -1, \quad y'(-1) = -4. \)
   - (a) Determine on what open interval the solution \( y = \phi(t) \) of the initial value problem is defined.
   - (b) Verify that both \( y_1(t) = t^2 \) and \( y_2(t) = 1/t \) are solutions of the differential equation. On what open interval(s) are both \( y_1(t) \) and \( y_2(t) \) solutions?
   - (c) Verify that the solutions \( y_1 \) and \( y_2 \) form a fundamental set of solutions. On what open interval(s)?
   - (d) Solve the initial value problem.

3. Solve the initial value problem \( y'' + 2y' + 2y = 0, \quad y(0) = 1, \quad y'(0) = -1. \)

4. Solve the initial value problem \( 4y'' + 4y' + y = 0, \quad y(2) = -6, \quad y'(2) = 4. \)

5. Consider the initial value problem \( t^2 y'' + 9ty' + 16y = 0, \quad y(1) = -1, \quad y'(1) = 1. \)
   - (a) Determine on what open interval the solution \( y = \phi(t) \) of the initial value problem is defined.
   - (b) Verify that \( y_1(t) = t^{-4} \) is a solution of the differential equation. Then find another solution \( y_2(t) \), not equal to a constant multiple of \( y_1(t) \), by using the method of reduction of order.
   - (c) Verify that solutions \( y_1 \) and \( y_2 \) form a fundamental set of solutions. On what open interval(s)?
   - (d) Solve the initial value problem.