Math 240 - Assignment 5

Name _____

September 24, 2026

Score _____

Show all work to receive full credit. Supply explanations when necessary. This assignment is due October 1.

1. Solve the initial value problem: $y'' - 2y' = 0; \quad y(0) = 3,\ y'(0) = -4$
2. Find the general solution: $6y'' - y' - 2y = 0$
3. Find the general solution: $y''' - y'' - 9y' + 9y = 0$
4. Solve the initial value problem: $4y'' + 20y' + 25y = 0; \quad y(0) = -1,\ y'(0) = -3$
5. Solve the initial value problem: $y''' + 2y'' + y' = 0; \quad y(0) = 2,\ y'(0) = 0,\ y''(0) = 1$
6. Solve the initial value problem: $y'' - 4y' + 13y = 0; \quad y(0) = -1,\ y'(0) = 2$
7. Find the general solution: $y''' + 3y'' - 4y = 0$
8. Solve the Cauchy-Euler equation: $x^2\dfrac{d^2y}{dx^2} + 5x\dfrac{dy}{dx} + 8y = 0$
9. Solve the Cauchy-Euler equation: $9x^2\dfrac{d^2y}{dx^2} - 3x\dfrac{dy}{dx} + 4y = 0$
10. A homogeneous, constant-coefficient, linear differential equation has the following characteristic equation:

    $$r(r-5)^3(r^2+6r+10) = 0.$$

    Find the general solution of the original differential equation.