

YOUR NAME: _____

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Read each problem **very carefully** before starting to solve it and do only what is asked. Each problem is worth around 5 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. [4 points] Solve the initial value problem

$$y'' - 4y' + 29y = 0, \quad y(0) = 3, \quad y'(0) = 10.$$

2. [4 points] Solve the initial value problem

$$y'' + 12y' + 36y = 0, \quad y(0) = 2, \quad y'(0) = -9.$$

3. [6 Points] Consider the differential equation

$$t^2 y'' - 3ty' + 3y = 0, \quad t > 0.$$

(a) Verify that $y_1(t) = t$ is a solution.

(b) Use reduction of order to find $v(t)$ so that $y_2(t) = v(t)y_1(t)$ is a solution that, together with $y_1(t)$, form a fundamental set of solutions.