

YOUR NAME: _____

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Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Solve the initial value problem

$$y'' + 3y' - 18y = 0, \quad y(0) = 3, \quad y'(0) = 0.$$

2. Solve the initial value problem

$$y'' + 6y' + 9y = 0, \quad y(0) = 7, \quad y'(0) = 2000.$$

3. Find the general solution of $y'' - 6y' + 13y = 0$.

4. Find the general solution of

$$y''' - y'' + y' - y = e^{-t}.$$

5. Consider the differential equation

$$y'' + y' - 2y = 2t.$$

(a) Find its complementary solution y_c .

(b) Use the method of variation of parameters to obtain a system of two equations in the two unknown functions $v_1'(t)$ and $v_2'(t)$ used in the method.

(c) Solve the system to find $v_1'(t)$ and $v_2'(t)$. (You do not have to integrate to find the functions v_1 and v_2 themselves.)