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. Find the particular solution of the initial value problem

$$y'' + 7y' + 10y = 0, \quad y(0) = 7, \ y'(0) = -20.$$

2. Find the particular solution of

$$y'' + 6y' + 34y = 0, \quad y(0) = -2, \ y'(0) = 21.$$

3. Find the general solution of

$$y'' + 14y' + 49y = 0.$$

4. Find the general solution of the nonhomogeneous differential equation

$$y'' + 4y' + 3y = 7e^{-3t}.$$

5. Use the method of variation of parameters to solve the differential equation

$$ty'' - (t+1)y' + y = t^2,$$

given that $y_1(t) = e^t$ and $y_2(t) = t+1$ form a fundamental set of solutions for the homogeneous differential equation.