

EXAM 2 - MATH 310

Thursday, October 10

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

$$y'' + 6y' + 5y = 0, \quad y(0) = 4, \quad y'(0) = 2.$$

2. Solve the initial value problem

$$y'' + 14y' + 49 = 0, \quad y(0) = 5, \quad y'(0) = -\frac{4}{3}.$$

3. Find the general solution of the linear second order nonhomogeneous differential equation

$$y'' + 4y = -7 \sin(5t).$$

4. Find the general solution of the linear second order nonhomogeneous differential equation

$$2y'' + 7y' + 3y = 20e^{-3t}.$$

5. Use variation of parameters to find the general solution of the differential equation

$$(x - 1)y'' - xy' + y = (x - 1)^2,$$

assuming that $y_1 = x$ and $y_2 = e^x$ are complementary solutions, i.e., solutions of the corresponding homogeneous equation.