

EXAM 4 - MATH 310

Thursday, November 26

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

$$y'' - 5y' + 6y = 2\delta(t - 7), \quad y(0) = 0, \quad y'(0) = 3.$$

2. Use convolutions instead of partial fraction decomposition to find  $\mathcal{L}^{-1}\left\{\frac{1}{(s-3)(s+7)}\right\}$ .

3. Solve the initial value problem

$$y'' + 36y = g(t), \quad y(0) = 1, \quad y'(0) = 7.$$

You may leave your answer in convolution form.

4. Find the general solution of

$$\mathbf{y}' = \begin{pmatrix} 3 & 4 \\ 9 & -2 \end{pmatrix} \mathbf{y}.$$

5. Find the general solution of

$$\mathbf{y}' = \begin{pmatrix} 1 & -1 & 1 \\ 1 & 1 & 0 \\ 0 & 0 & 3 \end{pmatrix} \mathbf{y}.$$

Please, leave your answers in real form (w/o imaginary numbers involved).