Ma 221   **Exam II B**   **14S**

I pledge my honor that I have abided by the Stevens Honor System.
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You may not use a calculator, cell phone, or computer while taking this exam. All work must be shown to obtain full credit. Credit will not be given for work not reasonably supported. When you finish, be sure to sign the pledge.

Note: A table of selected integrals appears on the last page of this exam.

Score on Problem #1a _____

                #1b _____

                #1c _____

                #2 _____

                #3 _____

                #4 _____

Total Score   _____

1. (30 **pts. total**)   Consider the differential equation

$$L[y] = y'' + 3y' - 4y = 3e^x + 4x^2.$$

1 a (6 **pts.**)   Find the solution of the corresponding homogeneous equation

$$L[y] = 0.$$

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1 b (20 **pts.**)   Find a particular solution of the equation

$$L[y] = y'' + 3y' - 4y = 3e^x + 4x^2.$$

1 c (4 **pts**.)   Give a general solution of the equation

$$L[y] = y'' + 3y' - 4y = 3e^x + 4x^2.$$

2 (25 pts)   Find a *particular* solution of the differential equation
$$y'' + 4y = 4\sin 2t.$$

3 $\left(\mathbf{25\ pts.}\right)$ Find a general solution of the equation

$$y'' + 2y' + y = e^{-x}\ln x.$$

4 $\left(20\ \textbf{pts.}\right)$ Solve the equation

$$x^2 y'' - 3xy' + 13y = 0.$$

Table of Integrals

$$\int \ln t \, dt = t(\ln t - 1) + C$$

$$\int t \ln t = \frac{1}{2}t^2 \ln t - \frac{1}{4}t^2 + C$$

$$\int (\ln t)^2 dt = t\left(\ln^2 t - 2\ln t + 2\right) + C$$

$$\int \frac{\ln t}{t} dt = \frac{1}{2} \ln^2 t + C$$

$$\int \frac{(\ln t)^2}{t} dt + C = \frac{1}{3} \ln^3 t + C$$

$$\int \frac{1}{t \ln t} dt = \ln(\ln t) + C$$