Name: ______________________________ **Sect. Number:** _________

TA: ________________________________ **Sect. Time:** _________

Math 20D.
Quiz 4
May 9, 2008

Answer each question completely, and show your work.
If you use extra paper, write your name on each extra page,
and staple the question page and your own added pages together.

1. (30 points) Verify that the functions $y_1(t) = t$ and $y_2(t) = te^t$ are solutions to the homogeneous differential equation

$$t^2 y'' - t(t+2)y' + (t+2)y = 0 \qquad t > 0,$$

and then use the method of variation of parameters to obtain a particular solution to the inhomogeneous differential equation

$$t^2 y'' - t(t+2)y' + (t+2)y = t^3 e^{3t} \qquad t > 0.$$

2. (35 points) Decide whether the set of vectors shown below is linearly dependent or independent. In the case that the set of vectors is linearly dependent, express one of them as a linear combination of the other two.

$$\left\{ \begin{bmatrix} 1 \\ 1 \\ 2 \end{bmatrix}, \begin{bmatrix} -1 \\ 2 \\ -1 \end{bmatrix}, \begin{bmatrix} 1 \\ 7 \\ 4 \end{bmatrix} \right\}$$

3. (35 points) Find all eigenvalues and eigenvectors of matrix A below. Also find all eigenvalues and eigenvectors of the matrix B below,

$$A = \begin{bmatrix} 3 & 0 & 1 \\ 0 & 3 & 2 \\ 0 & 0 & 1 \end{bmatrix} \qquad B = \begin{bmatrix} 3 & 1 & 1 \\ 0 & 3 & 2 \\ 0 & 0 & 1 \end{bmatrix}$$