

All necessary work must be shown for credit and must represent the question asked. Your work MUST be NEAT and your own and done in PENCIL. You may NOT use computers, notes or texts to look up answers. You are to do this homework **totally** on your own. You may ask at the SMLC for help with the concepts. Calculators and computers are only allowed for arithmetic calculations. You must turn the assignment in at the mailbox next to my office door at Roop Hall 115 by 12:00 PM (NOON) on Friday May 7.

I have neither received nor given help on this assignment.

(Signature) (1 point)

1. Solve the initial value ordinary differential equation
 $4y'' - 12y' + 9y = 0; y(1) = 1, y'(1) = 0.$ (6 points)

2. Solve the initial value ordinary differential equation
 $3y'' + 6y' + 6y = 0; y(0) = 0, y'(0) = 1.$
Describe the behavior of the solution in terms of the mass-spring system. (6 points)

3. Solve the ordinary differential equation $y''' - 4y' = 16x - \sin 2x + e^{2x}$. (12 points)

4. Solve the ordinary differential equation $x^2y'' - 6y = 10 - 25x^3$. Show that $y_1 = x^3$ is a solution to the corresponding homogeneous problem. (12 points)

5. Give the eigenvalues and corresponding eigenvectors of A, A^T, A^{-1} for $A = \begin{pmatrix} -1 & 0 & 1 \\ 0 & 1 & 0 \\ -3 & 2 & 3 \end{pmatrix}$.

(12 points)