0. (1 pt) Follow the instructions on this exam and any additional instructions given during the exam.

(6 pt) 1. Solve the initial value problem: \( 4y'' - 12y' + 9y = 0, \quad y(0) = 4, \quad y'(0) = 1. \)
(6 pt) 2. Find the general solution to the differential equation $y'' - 2y' - 3y = 2e^{3t}$. 
3. Solve the following linear differential system using the “eigenvalue” method. Give the general solution. You may leave your answer in vector form.

\[
\begin{align*}
    x'_1 &= 2x_2 \\
    x'_2 &= 3x_1 + x_2
\end{align*}
\]
4. The matrix $A$ has eigenvector $\begin{bmatrix} 1 - 4i \\ 3 \end{bmatrix}$ with corresponding eigenvalue $3 + 2i$. Solve the initial value problem $x' = Ax$, $x(0) = \begin{bmatrix} 1 \\ 6 \end{bmatrix}$. 