1. Consider the linear system

\[
\begin{align*}
\frac{dx}{dt} &= -x + 6y \\
\frac{dy}{dt} &= y \\
\frac{dz}{dt} &= -3x + 9y + 2z
\end{align*}
\]

(a) (3 pts) Write the above linear system in matrix form, i.e. as

\[X' = AX.\]

(b) (4 pts) Find the eigenvalues and eigenvectors of \( A \).

(c) (3 pts) Show that the set \( \{K_1e^{\lambda_1t}, K_2e^{\lambda_2t}, K_3e^{\lambda_3t}\} \) is linearly independent, where \( K_i \) is an eigenvector corresponding to the eigenvalue \( \lambda_i \) (\( i = 1, 2, 3 \)) calculated in Part (b).