1. Consider the linear system described by the state equations:

\[
\begin{align*}
\dot{x}_1 &= x_2 \\
\dot{x}_2 &= -2x_1 - 3x_2 + u \\
y &= x_1
\end{align*}
\]

a. Write the state equations in matrix form \( \dot{x} = Ax + Bu; y = Cx + Du \).

b. Analyze the stability properties of the system.

c. Determine \( x(t) \) and \( y(t) \) when \( u(t) \) is the step function and \( x(0) = [1 \ 0]^T \).

d. Repeat c with \( u(t) = \sin 2t \).