Consider the following matrix:

\[
A = \begin{bmatrix}
1 & 2 \\
1 & 3
\end{bmatrix}.
\]

**a.** Enter \(A\) as a Matlab variable.

**b.** Calculate the eigenvalues and eigenvectors of \(A\) using the Matlab function `eig`.

**c.** Consider the following dynamic system:

\[
X_0 = \begin{bmatrix} 1 \\ 0 \end{bmatrix}, \quad X_t = D^t X_0, \quad t = 1, 2, \ldots,
\]

where \(D\) is the diagonal matrix of eigenvalues of \(A\):

\[
D = \begin{bmatrix}
d_1 & 0 \\
0 & d_2
\end{bmatrix}.
\]

Calculate \(X_t\) for \(t = 1, \ldots, 7\).

**d.** Consider the following dynamic system:

\[
Y_0 = V_1, \quad Y_t = AY_{t-1}, \quad t = 1, 2, \ldots,
\]

where \(V_1\) is the eigenvector of \(A\) associated with the eigenvalue \(d_1\). Calculate \(Y_t\) for \(t = 1, \ldots, 7\).

**e.** Verify that \(Y_t = VX_t\) for each \(t = 1, \ldots, 7\), where \(V = [V_1 \ V_2]\) is the matrix of eigenvectors of \(A\).