A := matrix([[5,-1],[2,2]]); I2 := matrix([[1,0],[0,1]]):
det(lambda*I2-A); roots(%,lambda);

\[
A := \begin{bmatrix}
5 & -1 \\
2 & 2 \\
\end{bmatrix}
\]

\[\lambda^2 - 7\lambda + 12\]

[[3, 1], [4, 1]]

ref(A-3*I2); p3:=vector([1,2]); ref(A-4*I2); p4:=vector([1,1]);

\[
\begin{bmatrix}
1 & -1 \\
0 & 2 \\
\end{bmatrix}
\]

p3 := [1, 2]

\[
\begin{bmatrix}
1 & -1 \\
0 & 0 \\
\end{bmatrix}
\]

p4 := [1, 1]

A := matrix([[-3,4],[-1,1]]); det(lambda*I2-A); roots(%,lambda);

\[
A := \begin{bmatrix}
-3 & 4 \\
-1 & 1 \\
\end{bmatrix}
\]

\[\lambda^2 + 2\lambda + 1\]

[[-1, 2]]

ref(A+1*I2); p1:=vector([2,1]); evalm(A*p1+1*p1);

p1 := [2, 1]

[0, 0]

ex 13 p. 306

restart; with(linalg):
A := matrix([[1,2,1],[-1,0,1],[1,1,0]]); I3 := matrix([[1,0,0],[0,1,0],[0,0,1]]); mu := evalf(Eigenvals(A,vecs));
print(vecs); # the eigenvectors are not lin ind

\[
A := \begin{bmatrix}
1 & 2 & 1 \\
-1 & 0 & 1 \\
1 & 1 & 0 \\
\end{bmatrix}
\]

I3 := \[
\begin{bmatrix}
1 & 0 & 0 \\
0 & 1 & 0 \\
0 & 0 & 1 \\
\end{bmatrix}
\]

\mu := [0, 0, 1.0000000000] [0.7071067812, -0.7071067812, 3.0000000000]
[-0.7071067812, 0.7071067812, -1.0000000000]
[0.7071067812, -0.7071067812, 2.0000000000]

more conclusive

det(A-lambda*I3); factor(%); b := vector([0,0,0]); B:=1*I3-A; x:=linsolve(B,b); B:=0*I3-A; y:=linsolve(B,b);
\[
\lambda^2 - \lambda^3 \\
-\lambda^2 (-1 + \lambda) \\
b := [0, 0, 0] \\
B := I3 - A \\
x := [-3 \_t, \_t, -\_t, \_t] \\
B := -A \\
y := [\_t, -\_t, \_t, \_t]
\]

needs 3 lin ind eig to be diag

> A := matrix([[1, 1, 1], [0, -1, 0], [0, 0, -1]]); I3 := matrix([[1, 0, 0], [0, 1, 0], [0, 0, 1]]); det(lambda*I3-A); factor(%); b := vector([0, 0, 0]); B := 1*I3 - A; x := linsolve(B, b); y := linsolve(B, b); p1 := vector([2, 1]); p2 := vector([-3, 1]); P := augment(p1, p2);

\[
A := \begin{bmatrix}
1 & 1 & 1 \\
0 & -1 & 0 \\
0 & 0 & -1
\end{bmatrix} \\
I3 := \begin{bmatrix}
1 & 0 & 0 \\
0 & 1 & 0 \\
0 & 0 & 1
\end{bmatrix} \\
\begin{align*}
(\lambda - 1)(\lambda + 1)^2 \\
(\lambda - 1)(\lambda + 1)^2 \\
b := [0, 0, 0] \\
B := I3 - A \\
x := [\_t, 0, 0] \\
B := -I3 - A \\
y := [\_t, -2 \_t, -\_t, \_t] \\
p1 := [1, 0, 0]
\end{align*}
\]
\[
p_2 := [1, -2, 0] \\
p_3 := [0, -1, 1] \\
P := \begin{bmatrix} 1 & 1 & 0 \\ 0 & -2 & -1 \\ 0 & 0 & 1 \end{bmatrix}
\]

\[
D := \text{evalm}(P^{-1} \& A \& P) \cdot \text{evalm}(P \& DD^{(2002)} \& P^{-1}))
\]

\[
DD := \begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{bmatrix}
\]