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> with(LinearAlgebra);
[&x, Add, Adjoint, BackwardSubstitute, BandMatrix, Basis, BezoutMatrix, BidiagonalForm,
BilinearForm, CARE, CharacteristicMatrix, CharacteristicPolynomial, Column,
ColumnDimension, ColumnOperation, ColumnSpace, CompanionMatrix,
CompressedSparseForm, ConditionNumber, ConstantMatrix, ConstantVector, Copy,
CreatePermutation, CrossProduct, DARE, DeleteColumn, DeleteRow, Determinant,
Diagonal, DiagonalMatrix, Dimension, Dimensions, DotProduct, EigenConditionNumbers,
Eigenvalues, Eigenvectors, Equal, ForwardSubstitute, FrobeniusForm,
FromCompressedSparseForm, FromSplitForm, GaussianElimination, GenerateEquations,
GenerateMatrix, Generic, GetResultDataType, GetResultShape, GivensRotationMatrix,
GramSchmidt, HankelMatrix, HermiteForm, HermitianTranspose, HessenbergForm,
HilbertMatrix, HouseholderMatrix, IdentityMatrix, IntersectionBasis, IsDefinite,
IsOrthogonal, IsSimilar, IsUnitary, JordanBlockMatrix, JordanForm, KroneckerProduct,
LA_Main, LUdecomposition, LeastSquares, LinearSolve, LyapunovSolve, Map, Map2,
MatrixAdd, MatrixExponential, MatrixFunction, MatrixInverse, MatrixMatrixMultiply,
MatrixNorm, MatrixPower, MatrixScalarMultiply, MatrixVectorMultiply,
MinimalPolynomial, Minor, Modular, Multiply, NoUserValue, Norm, Normalize,
NullSpace, OuterProductMatrix, Permanent, Pivot, PopovForm, ProjectionMatrix,
QRdecomposition, RandomMatrix, RandomVector, Rank, RationalCanonicalForm,
ReducedRowEchelonForm, Row, RowDimension, RowOperation, RowSpace, ScalarMatrix,
ScalarMultiply, ScalarVector, SchurForm, SingularValues, SmithForm, SplitForm,
StronglyConnectedBlocks, SubMatrix, SubVector, SumBasis, SylvesterMatrix,
SylvesterSolve, ToeplitzMatrix, Trace, Transpose, TridiagonalForm, UnitVector,
VandermondeMatrix, VectorAdd, VectorAngle, VectorMatrixMultiply, VectorNorm,
VectorScalarMultiply, ZeroMatrix, ZeroVector, Zip]

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(1)

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> Omega := 1/2 [ 2  0  0
                 0  3 -1
                 0 -1  3 ];

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$$\Omega := \begin{bmatrix} 1 & 0 & 0 \\ 0 & \frac{3}{2} & -\frac{1}{2} \\ 0 & -\frac{1}{2} & \frac{3}{2} \end{bmatrix} \tag{2}$$

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> Eigenvalues(Omega);

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$$\begin{bmatrix} 2 \\ 1 \\ 1 \end{bmatrix} \tag{3}$$

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> Eigenvectors(Omega);

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(4)

$$\begin{bmatrix} 1 \\ 1 \\ 2 \end{bmatrix}, \begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & -1 \\ 1 & 0 & 1 \end{bmatrix} \quad (4)$$

$$\text{> } A := \begin{bmatrix} 1 & 0 & 1 \\ 0 & 0 & 0 \\ 1 & 0 & 1 \end{bmatrix};$$

$$A := \begin{bmatrix} 1 & 0 & 1 \\ 0 & 0 & 0 \\ 1 & 0 & 1 \end{bmatrix} \quad (5)$$

$\text{> } \text{Eigenvectors}(A);$

$$\begin{bmatrix} 0 \\ 0 \\ 2 \end{bmatrix}, \begin{bmatrix} -1 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix} \quad (6)$$

$$\text{> } B := \begin{bmatrix} 2 & 1 & 1 \\ 1 & 0 & -1 \\ 1 & -1 & 2 \end{bmatrix};$$

$$B := \begin{bmatrix} 2 & 1 & 1 \\ 1 & 0 & -1 \\ 1 & -1 & 2 \end{bmatrix} \quad (7)$$

$\text{> } \text{Eigenvectors}(B);$

$$\begin{bmatrix} 3 \\ -1 \\ 2 \end{bmatrix}, \begin{bmatrix} 1 & -1 & -1 \\ 0 & 2 & -1 \\ 1 & 1 & 1 \end{bmatrix} \quad (8)$$

>