```
> with(LinearAlgebra):       -- This loads the LinearAlgebra package
> A:=Matrix([[0,2,1],[1,0,2],[1,2,0]]);
```

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

```
> B:=Matrix([[1,2,4,1],[3,4,5,1],[4,5,6,1]]);
```

$$B := \begin{bmatrix} 1 & 2 & 4 & 1 \\ 3 & 4 & 5 & 1 \\ 4 & 5 & 6 & 1 \end{bmatrix} \quad (2)$$

```
> u:=<1,2,3>;        -- a column vector
```

$$u := \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} \quad (3)$$

```
> v:=<5,2,1>;
```

$$v := \begin{bmatrix} 5 \\ 2 \\ 1 \end{bmatrix} \quad (4)$$

```
> A.B;            -- matrix multiplication
```

$$\begin{bmatrix} 10 & 13 & 16 & 3 \\ 9 & 12 & 16 & 3 \\ 7 & 10 & 14 & 3 \end{bmatrix} \quad (5)$$

```
> A.u;
```

$$\begin{bmatrix} 7 \\ 7 \\ 5 \end{bmatrix} \quad (6)$$

```
> u.v;          -- dot product
```

$$12 \quad (7)$$

```
> ReducedRowEchelonForm(A);
```

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \quad (8)$$

```
> ReducedRowEchelonForm(B);
```

(9)

$$\begin{bmatrix} 1 & 0 & 0 & -1 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{bmatrix} \quad (9)$$

```
> MatrixInverse(A);
```

$$\begin{bmatrix} -\frac{2}{3} & \frac{1}{3} & \frac{2}{3} \\ \frac{1}{3} & -\frac{1}{6} & \frac{1}{6} \\ \frac{1}{3} & \frac{1}{3} & -\frac{1}{3} \end{bmatrix} \quad (10)$$

```
> Transpose(B);
```

$$\begin{bmatrix} 1 & 3 & 4 \\ 2 & 4 & 5 \\ 4 & 5 & 6 \\ 1 & 1 & 1 \end{bmatrix} \quad (11)$$

```
> Eigenvalues(A);
```

$$\begin{bmatrix} 3 \\ -2 \\ -1 \end{bmatrix} \quad (12)$$

```
> Eigenvectors(A);    -- The columns of the matrix are eigenvectors.
```

$$\begin{bmatrix} -1 \\ 3 \\ -2 \end{bmatrix}, \begin{bmatrix} -3 & 1 & 1 \\ 1 & 1 & -\frac{3}{2} \\ 1 & 1 & 1 \end{bmatrix}$$

They are listed in the same order as the eigenvalues. (13)