```
> restart;
  v := Vector([1,1]);
```

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

```
> w := <2,1>;
```

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

```
> v+w;
```

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

```
> 2*v;
```

$$\begin{bmatrix} 2 \\ 2 \end{bmatrix} \quad (4)$$

```
> v.w;
```

$$3 \quad (5)$$

```
> b := Vector(2);
```

$$b := \begin{bmatrix} 0 \\ 0 \end{bmatrix} \quad (6)$$

```
> for i to 2 do b[i] := i; od:
> b;
```

$$\begin{bmatrix} 1 \\ 2 \end{bmatrix} \quad (7)$$

```
> A := Matrix([[1,1],[1,0]]);
```

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

```
> B := Matrix(2,2);
```

$$B := \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} \quad (9)$$

```
> for i to 2 do
     for j to 2 do
         B[i,j] := i+j;
     od;
  od:
  B;
```

$$(10)$$

$$\begin{bmatrix} 2 & 3 \\ 3 & 4 \end{bmatrix} \quad (10)$$

```
> 2*A;
```

$$\begin{bmatrix} 2 & 2 \\ 2 & 0 \end{bmatrix} \quad (11)$$

```
> A+B;
```

$$\begin{bmatrix} 3 & 4 \\ 4 & 4 \end{bmatrix} \quad (12)$$

```
> A.B;
```

$$\begin{bmatrix} 5 & 7 \\ 2 & 3 \end{bmatrix} \quad (13)$$

```
> A.v;
```

$$\begin{bmatrix} 2 \\ 1 \end{bmatrix} \quad (14)$$

```
> 1/A;
```

$$\begin{bmatrix} 0 & 1 \\ 1 & -1 \end{bmatrix} \quad (15)$$

```
> with(LinearAlgebra):
> A;
```

$$\begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix} \quad (16)$$

```
> Determinant(A);
```

$$-1 \quad (17)$$

To solve $Ax = b$ for x

```
> LinearSolve(A,b);
```

$$\begin{bmatrix} 2 \\ -1 \end{bmatrix} \quad (18)$$

```
> (1/A) . b ;
```

$$\begin{bmatrix} 2 \\ -1 \end{bmatrix} \quad (19)$$

```
> \I2 := IdentityMatrix(2);
```

$$I2 := \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \quad (20)$$

```
> B := <A|I2>;
```

$$B := \begin{bmatrix} 1 & 1 & 1 & 0 \\ 1 & 0 & 0 & 1 \end{bmatrix} \tag{21}$$

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

$$\begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 1 & -1 \end{bmatrix} \tag{22}$$

```
> C := CharacteristicPolynomial(A,x);
```

$$C := -1 + x^2 - x \tag{23}$$

```
> solve(C=0,x);
```

$$\frac{1}{2}\sqrt{5} + \frac{1}{2}, \frac{1}{2} - \frac{1}{2}\sqrt{5} \tag{24}$$

```
> fsolve(C=0,x);
```

$$-0.6180339887, 1.618033989 \tag{25}$$

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

$$\begin{bmatrix} \frac{1}{2}\sqrt{5} + \frac{1}{2} \\ \frac{1}{2} - \frac{1}{2}\sqrt{5} \end{bmatrix} \tag{26}$$

```
> Eigenvectors(A);
```

$$\begin{bmatrix} \frac{1}{2}\sqrt{5} + \frac{1}{2} \\ \frac{1}{2} - \frac{1}{2}\sqrt{5} \end{bmatrix}, \begin{bmatrix} \frac{1}{\frac{1}{2}\sqrt{5} - \frac{1}{2}} & \frac{1}{-\frac{1}{2} - \frac{1}{2}\sqrt{5}} \\ 1 & 1 \end{bmatrix} \tag{27}$$

```
> A := Matrix([[1,1,1],[x,y,z],[x^2,y^2,z^2]]);
```

$$A := \begin{bmatrix} 1 & 1 & 1 \\ x & y & z \\ x^2 & y^2 & z^2 \end{bmatrix} \tag{28}$$

```
> d := Determinant(A);
```

$$d := y z^2 - z y^2 + x y^2 - x z^2 + x^2 z - x^2 y \tag{29}$$

```
> factor(d);
```

$$-(-z+y)\,(x-z)\,(x-y) \tag{30}$$