

```

> # Aufgabe 8.1
> restart;
> with(LinearAlgebra):
> v := <3,-4,1>;

```

$$v := \begin{bmatrix} 3 \\ -4 \\ 1 \end{bmatrix}$$

(1)

```

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

```

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

(2)

```

> A := Matrix([[ 1 , 2 , 0 ],
               [ 3 , 4 , -2 ],
               [ 2 , -1 , 5 ]]);

```

$$A := \begin{bmatrix} 1 & 2 & 0 \\ 3 & 4 & -2 \\ 2 & -1 & 5 \end{bmatrix}$$

(3)

```

> S := Matrix([[ 2 , 1 , 1 ],
               [ 1 , 4 , 1 ],
               [ 1 , 1 , 2 ]]);

```

$$S := \begin{bmatrix} 2 & 1 & 1 \\ 1 & 4 & 1 \\ 1 & 1 & 2 \end{bmatrix}$$

(4)

```

> A . v;

```

$$\begin{bmatrix} -5 \\ -9 \\ 15 \end{bmatrix}$$

(5)

```

> S . A - A . S;

```

$$\begin{bmatrix} 3 & -2 & 0 \\ 7 & 0 & -6 \\ 0 & 1 & -3 \end{bmatrix}$$

(6)

```

> I3 := IdentityMatrix(3);

```

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

(7)

```

> Determinant(A - 5*I3);

```

$$0$$

(8)

```

> Transpose(w) . S . w;

```

(9)

```
> S^(-1) . A . S; # oder MatrixInverse(S) . A . S;
```

$$\begin{bmatrix} -\frac{2}{5} & \frac{37}{10} & -\frac{3}{2} \\ \frac{6}{5} & \frac{39}{10} & -\frac{1}{2} \\ \frac{18}{5} & -\frac{23}{10} & \frac{13}{2} \end{bmatrix}$$