

Computergestuetzte Mathematik zur Analysis

Lektion 4

```
> restart;
```

Listen, Mengen und Folgen

```
> liste := [1,0,3,4,2];  
liste:= [1, 0, 3, 4, 2] (1.1)
```

```
> menge := {1,0,4,1};  
menge:= {0, 1, 4} (1.2)
```

```
> mengel:= {1,2,4,5};  
mengel:= {1, 2, 4, 5} (1.3)
```

```
> menge union mengel;  
{0, 1, 2, 4, 5} (1.4)
```

```
> folge := x,y,z;  
folge:= x, y, z (1.5)
```

```
> x$3;  
x, x, x (1.6)
```

```
> seq(1/k,k=1..4);  
1,  $\frac{1}{2}$ ,  $\frac{1}{3}$ ,  $\frac{1}{4}$  (1.7)
```

```
> liste[2];  
0 (1.8)
```

```
> menge[2];  
1 (1.9)
```

```
> folge[1];  
x (1.10)
```

```
> convert(liste,set);  
{0, 1, 2, 3, 4} (1.11)
```

```
> convert(menge,list);  
[0, 1, 4] (1.12)
```

```
> [folge];  
[x, y, z] (1.13)
```

```
> {folge};  
{x, y, z} (1.14)
```

```
> [(1.7)];  
 $\left[1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}\right]$  (1.15)
```

```
> nops(%);
```

4 (1.16)

Op / Map / Apply

```
> u:=[a,b,c];
```

$u := [a, b, c]$ (2.1)

```
> a:= x^2+y^(1/2)+sin(z);
```

$a := x^2 + \sqrt{y} + \sin(z)$ (2.2)

```
> u;
```

$[x^2 + \sqrt{y} + \sin(z), b, c]$ (2.3)

```
> nops(u);
```

3 (2.4)

```
> nops(a);
```

3 (2.5)

```
> whattype(a);
```

`C` (2.6)

```
> op(1,a);
```

x^2 (2.7)

```
> op(2,a);
```

\sqrt{y} (2.8)

```
> op(3,a);
```

$\sin(z)$ (2.9)

```
> u;
```

$[x^2 + \sqrt{y} + \sin(z), b, c]$ (2.10)

```
> op(1,u);
```

$x^2 + \sqrt{y} + \sin(z)$ (2.11)

```
> whattype(u);
```

list (2.12)

```
> op(2..3,u);
```

b, c (2.13)

```
> op(1,op(1,u));
```

x^2 (2.14)

Mehr zu Maple Operatoren

```
> ex1 := x^2-y*z*sin(v)+(1/2)*Pi+int(g(x),x=0..1);
```

$ex1 := x^2 - yz \sin(v) + \frac{1}{2} \pi + \int_0^1 g(x) dx$ (2.1.1)

```
> op(ex1);whattype(ex1);
```

$$x^2, -yz \sin(v), \frac{1}{2} \pi, \int_0^1 g(x) dx$$

``C`` (2.1.2)

```
> whattype(ex1);
```

``C`` (2.1.3)

```
> op(2,ex1);
```

$-yz \sin(v)$ (2.1.4)

```
> whattype(op(2,ex1));
```

``*`` (2.1.5)

```
> op(1,op(2,ex1));
```

-1 (2.1.6)

```
> op(4,op(2,ex1));
```

$\sin(v)$ (2.1.7)

```
> whattype(op(4,op(2,ex1)));
```

function (2.1.8)

```
> f := x -> x^2;
```

$f:= x \rightarrow x^2$ (2.15)

```
> liste;
```

[1, 0, 3, 4, 2] (2.16)

```
> f(liste);
```

[1, 0, 3, 4, 2]² (2.17)

```
> map(f, liste);
```

[1, 0, 9, 16, 4] (2.18)

```
> map(f, menge);
```

{0, 1, 16} (2.19)

Fehlerquelle:

```
> map(sin, folge);
```

Error, (in sin) expecting 1 argument, got 3

```
> map(sin, [folge]);
```

[sin(x), sin(y), sin(z)] (2.20)

```
> apply(g);
```

$g()$ (2.21)

```
> apply(h,s,t,u,v);
```

$h(s, t, [x^2 + \sqrt{y} + \sin(z), b, c], v)$ (2.22)

```
> apply(sin,Pi);
```

0 (2.23)

```
> map(apply,[sin,cos,tan],Pi);
```

[0, -1, 0] (2.24)

```
> q:=sin(x) + y^2 + x*y^z;  
q:= sin(x) + y2 + xyz (2.25)
```

```
> p:=unapply(q,x,y,z);  
p:= (x, y, z) → sin(x) + y2 + xyz (2.26)
```

```
> p(1,0,2);  
sin(1) (2.27)
```

```
> liste1 := [1, 2, 4, 6];  
liste2 := [-1,2,3,4];  
liste1 := [1, 2, 4, 6]  
liste2 := [-1, 2, 3, 4] (2.28)
```

```
> g := (x,y) -> x+y;  
g:= (x, y) → x + y (2.29)
```

```
> zip(g,liste1,liste2,liste1);  
[0, 4, 7, 10] (2.30)
```