Computergestuetzte Mathematik zur Analysis

Lektion 5 (Programmsteuerung)

For Schleifen

```
> liste := [a, b, x+y];
```

$$liste := [a, b, x+y] \qquad (1.1)$$

Zeilenumbruch mit "Shift" "Enter"

```
> for l in liste do
    l^3;
  od;
```

$$a^3$$
$$b^3$$
$$(x+y)^3 \qquad (1.2)$$

```
> for j from 4 to 8 do
    j, evalf(sin(Pi/j));
  od;
```

```
4, 0.7071067810
5, 0.5877852524
6, 0.5000000000
7, 0.4338837393
8, 0.3826834325                    (1.3)
```

```
> out := 0;
```

$$out := 0 \qquad (1.4)$$

```
> for le in [1, z, x^2, y^3, 3] do
    out := out+le:
  end do:
  out;
```

$$4 + z + x^2 + y^3 \qquad (1.5)$$

Einfache logische Aussagen

```
> a := 3; b := 5;
```

$$a := 3$$
$$b := 5 \qquad (2.1)$$

```
> a < b;
```

(2.2)

$$3 < 5 \tag{2.2}$$

```
> evalb(a < b);
```

$$\mathit{true} \tag{2.3}$$

```
> is(a = b);
```

$$\mathit{false} \tag{2.4}$$

```
> is (a<>b);  # a ungleich b,
```

$$\mathit{true} \tag{2.5}$$

```
> is(a ≠ b);     # a "!=" b # a ungleich in 2D Maple Input
```

$$\mathit{true} \tag{2.6}$$

```
> a := true; b := false; c := true;
```

$$a := \mathit{true}$$

$$b := \mathit{false}$$

$$c := \mathit{true} \tag{2.7}$$

```
> a and b;
```

$$\mathit{false} \tag{2.8}$$

```
> a or b;
```

$$\mathit{true} \tag{2.9}$$

```
> `or`(a, b);
```

$$\mathit{true} \tag{2.10}$$

```
> `xor`(a, b);
```

$$\mathit{true} \tag{2.11}$$

```
> a := 1+I;
```

$$a := 1 + \mathrm{I} \tag{2.12}$$

```
> is(a, real);
```

$$\mathit{false} \tag{2.13}$$

```
> is(a, integer);
```

$$\mathit{false} \tag{2.14}$$

```
> is(a, complex);
```

$$\mathit{true} \tag{2.15}$$

```
> ? property
```

If Abfragen

```
> a := 3; b := 5;
```

$$a := 3$$

$$b := 5 \tag{3.1}$$

```
> if b < a then
   a
  else
```

```
    b
   end if;
```

$$5 \qquad (3.2)$$

```
> for j from 4 to 8 do
     j, evalf(sin(Pi/j)):
     if isprime(j) then
       print(j, eval(sin(Pi/j))):
     fi:
    od:
```

$$5, \sin\left(\frac{1}{5}\,\pi\right)$$

$$7, \sin\left(\frac{1}{7}\,\pi\right) \qquad (3.3)$$

While Schleife

```
> q := 1016;
  while type(q, even) do
    q := (1/2)*q
  end do;
  q;
```

$$q := 1016$$

$$q := 508$$

$$q := 254$$

$$q := 127$$

$$127 \qquad (4.1)$$

Maple Funktionen

```
> restart;
> myfun := proc(x,n,m)
    description "Berechne sin(nx) cos(mx)";
    sin(n*x) * cos(m*x);
  end proc;
```

myfun := **proc**(*x*, *n*, *m*) (5.1)

description "Berechne sin(nx) cos(mx)";

$\sin(n * x) * \cos(m * x)$

end proc

```
>
> myfun2 := proc (x, n, m)
    local a, b;
    description "Berechne sin(nx) cos(mx)";
```

```
      a := sin(n*x);
      b := cos(m*x);
      a*b
    end proc;
```

```
myfun2 := proc(x, n, m)
    local a, b;
    description "Berechne sin(nx) cos(mx)";
    a := sin(n*x); b := cos(m*x); a*b
end proc
```
(5.2)

```
>
> myfun(x, 2, 3)+1;
```

$$\sin(2\,x)\cos(3\,x)+1 \qquad \textbf{(5.3)}$$

```
> Describe(myfun2);

# Berechne sin(nx) cos(mx)
myfun2( x, n, m )
```

```
> myfun(x, 3, 4);
```

$$\sin(3\,x)\cos(4\,x) \qquad \textbf{(5.4)}$$

```
> a;
```

$$a \qquad \textbf{(5.5)}$$

```
>
> divide2s := proc (n)
      local q;
      q := n;
      while type(q, even) do
        q := (1/2)*q
      end do;
      q;
      end proc;
```

```
divide2s := proc(n)
    local q;
    q := n; while type(q, even) do q := 1 / 2 * q end do; q
end proc
```
(5.6)

```
> divide2s(1016);
                                127
```
(5.7)