

Kurs ■ Cours

5. Etwas Umgang mit Mathematica ■ Savoir un peu manier *Mathematica*

Die Gliederung dieses Kurses folgt in groben Zügen dem Buch von Nancy Blachman: A Practical Approach....

Hinweis: Kapitel 5 lesen!

Run mit WIN+*Mathematica* Version 5.2

■ L'articulation de ce cours correspond à peu près à celle du livre de Nancy Blachman: A Practical Approach....

Indication: Lire le chapitre 5.

Testé avec *Mathematica* version 5.2+WIN

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Achtung: *Mathematica* neu starten, sonst könnte sehr viel Output auf den Schirm kommen.....

■ Attention: Démarrer à nouveau *Mathematica*, sinon il pourrait y sortir beaucoup d'output sur l'écran...

5.1. Seiten-Breite setzen

■ Fixer la largeur des pages

Ein Vorspann

■ Préparatifs

"Material" erzeugen zur späteren Benutzung:

■ Générer des "matériaux" à utiliser plus tard:

```
In[1]:= (*n30*)
```

```
In[2]:= Clear[n30]
```

```
In[3]:= n30[x_]:=N[x,30]
```

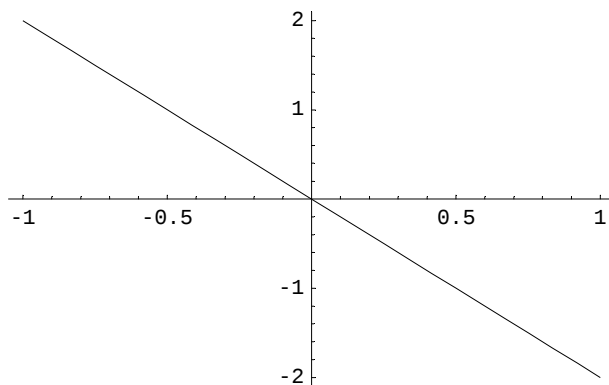
```
In[4]:= a = 4
```

```
Out[4]= 4
```

```
In[5]:= n30[Pi]
```

```
Out[5]= 3.14159265358979323846264338328
```

```
In[6]:= Plot[-2x,{x,-1,1}];
```



Anzahl Output-Charakter verändern:

■ Changer le caractère de l'output:

```
In[7]:= ??SetOpt*
```

System`

SetOptions SetOptionsPacket

```
In[8]:= ??$Output
```

\$Output gives the list of files and pipes to which standard output from Mathematica is sent.
Mehr...

```
$Output = {OutputStream[stdout, 1]}
```

```
In[9]:= ??Pag*
```

System`

PageBreakAbove PageFooterLines PageHeaders
PageBreakBelow PageFooters PageHeight
PageBreakWithin PageHeaderLines PageWidth

```
In[10]:= ??PageWidth
```

PageWidth is an option for output streams and for cells which
specifies how wide each line of text should be allowed to be. Mehr...

```
Attributes[PageWidth] = {Protected}
```

```
In[11]:= SetOptions[$Output, PageWidth -> 45]
```

```
Out[11]= {{BinaryFormat -> False, FormatType -> StandardForm,
           PageWidth -> 45, PageHeight -> 22, TotalWidth -> ∞, TotalHeight -> ∞,
           CharacterEncoding -> Unicode, NumberMarks -> $NumberMarks}}
```

```
In[12]:= Options[$Output]
```

```
Out[12]= {BinaryFormat -> False, FormatType -> StandardForm,
           PageWidth -> 45, PageHeight -> 22, TotalWidth -> ∞, TotalHeight -> ∞,
           CharacterEncoding -> Unicode, NumberMarks -> $NumberMarks}
```

In 5.2. werden folgende Befehle besprochen: "In", "Out". Probiere:

■ Dans 5.2. on discute les ordres suivants: "In", "Out". Essaie:

```
In[13]:= ??In
```

In[n] is a global object that is assigned to have a delayed value of the nth input line.
Mehr...

```
Attributes[In] = {Listable, Protected}
```

```
In[1] := Null
```

```
In[2] := Clear[n30]
```

```
In[3] := n30[x_] := N[x, 30]
```

```
In[4] := a = 4
```

```
In[5] := n30[π]
```

```
In[6] := (Plot[-2 x, {x, -1, 1}];)
```

```
In[7] := Information[SetOpt*, LongForm -> True]
```

```
In[8] := Information[$Output, LongForm -> True]
```

```
In[9] := Information[Pag*, LongForm -> True]
```

```
In[10] := Information[PageWidth, LongForm -> True]
```

```
In[11] := SetOptions[$Output, PageWidth -> 45]
```

```
In[12] := Options[$Output]
```

```
In[13] := Information[In, LongForm -> True]
```

```
In[14]:= linie = $Line;
??Out
```

%n or Out[n] is a global object that is assigned to be the value produced on the nth output line. % gives the last result generated. %% gives the result before last. %% ... % (k times) gives the kth previous result. Mehr...

```
Attributes[Out] = {Listable, Protected}
```

```
Out[0] = 0
```

```
%1 = Null
```

```
%2 = Null
```

```
%3 = Null
```

```
%4 = 4
```

```
%5 = 3.14159265358979323846264338328
```

```
%6 =
```

```
Graphics[{{Line[{{-1., 2.}, {-0.918866, 1.83773}, {-0.830382, 1.66076}, {-0.747281, 1.49456},
{-0.667363, 1.33473}, {-0.582295, 1.16459}, {-0.50041, 1.00082}, {-0.413374, 0.826748},
{-0.329521, 0.659043}, {-0.248852, 0.497704}, {-0.163032, 0.326064},
{-0.0803953, 0.160791}, {-0.000941658, 0.00188332}, {0.0836623, -0.167325},
{0.165083, -0.330166}, {0.251654, -0.503309}, {0.335043, -0.670085},
{0.415248, -0.830495}, {0.500603, -1.00121}, {0.582775, -1.16555}, {0.670098, -1.3402},
{0.754238, -1.50848}, {0.835194, -1.67039}, {0.921301, -1.8426}, {1., -2.}}]}],
{PlotRange → Automatic, AspectRatio →  $\frac{1}{\text{GoldenRatio}}$ , DisplayFunction → $DisplayFunction,
ColorOutput → Automatic, Axes → Automatic, AxesOrigin → Automatic,
PlotLabel → None, AxesLabel → None, Ticks → Automatic,
GridLines → None, Prolog → {}, Epilog → {}, AxesStyle → Automatic,
Background → Automatic, DefaultColor → Automatic,
DefaultFont → $DefaultFont, RotateLabel → True,
Frame → False, FrameStyle → Automatic, FrameTicks → Automatic,
FrameLabel → None, PlotRegion → Automatic, ImageSize → Automatic,
TextStyle → $TextStyle, FormatType → $FormatType}]
```

```
%7 = {Null}
```

```
%8 = {Null}
```

```
%9 = {Null}
```

```
%10 = {Null}
```

```
%11 = {{BinaryFormat → False, FormatType → StandardForm, PageWidth → 45, PageHeight → 22,
TotalWidth → ∞, TotalHeight → ∞, CharacterEncoding → Unicode, NumberMarks → $NumberMarks}}
```

```
%12 = {{BinaryFormat → False, FormatType → StandardForm, PageWidth → 45, PageHeight → 22,
TotalWidth → ∞, TotalHeight → ∞, CharacterEncoding → Unicode, NumberMarks → $NumberMarks}}
```

```
%13 = {Null}
```

```
%14 = 14
```

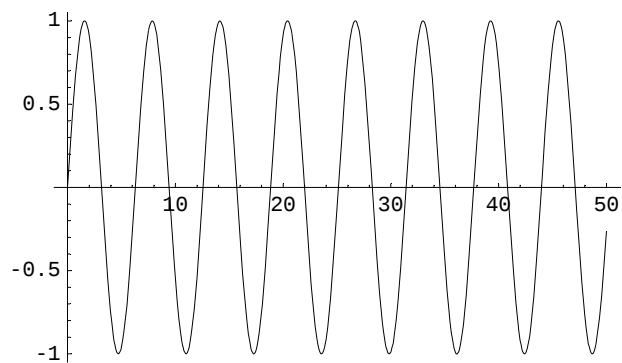
```
In[16]:= linie
```

```
Out[16]= 14
```

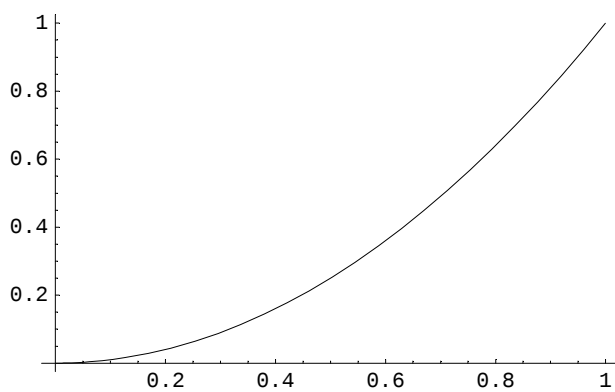
"Material" erzeugen zur späteren Benutzung:

■ Générer des "matériaux" à utiliser plus tard:

```
In[17]:= Plot[Sin[x],{x,0,50}];
```



```
In[18]:= Plot[x^2,{x,0,1}];
```



5.2. Listings von Input und Output

■ Listings d'input et d'output

5.2.1. Input-Lines auflisten

■ Faire une liste des input-lines

Mit "Recall" in älteren Versionen. Neu mit "InString":

■ Dans les versions plus vieilles avec "Recall". Dans les versions nouvelles avec "InString":

```
In[19]:= Recall[1, 2, 3]
```

```
Out[19]= Recall[1, 2, 3]
```

In[20]:= ??InString

InString[n] is a global object that is assigned to be the text of the nth input line. Mehr...

Attributes[InString] = {Listable, Protected}

InString[1] = (*n30*)

InString[2] = Clear[n30]

InString[3] = n30[x_] := N[x, 30]

InString[4] = a = 4

InString[5] = n30[Pi]

InString[6] = Plot[-2x, {x, -1, 1}];

InString[7] = ??SetOpt*

InString[8] = ??\$Output

InString[9] = ??Pag*

InString[10] = ??PageWidth

InString[11] = SetOptions[\$Output, PageWidth -> 45]

InString[12] = Options[\$Output]

InString[13] = ??In

InString[14] = linie = \$Line;

InString[15] = ??Out

InString[16] = linie

InString[17] = Plot[Sin[x], {x, 0, 50}];

InString[18] = Plot[x^2, {x, 0, 1}];

InString[19] = Recall[1, 2, 3]

InString[20] = ??InString

In[21]:= InString[{1, 2, 3, 4, 5, 6}]

Out[21]= {(*n30*), Clear[n30], n30[x_] := N[x, 30], a = 4, n30[Pi], Plot[-2x, {x, -1, 1}];}

In[22]:= In[1]

In[23]:= Out[1]

Achtung: Wenn Du *Mathematica* nicht neu gestartet hast, so könnte hier sehr viel Output auf den Schirm kommen.....

Es könnte eine Stunde oder mehr dauern!

■ **Attention:** Démarrer à nouveau *Mathematica*, sinon il

pourrait y sortir beaucoup d'output sur l'écran... Cela pourrait durer plus d'une heure!

In[24]:= ??In

In[n] is a global object that is assigned to have a delayed value of the nth input line.
Mehr...

Attributes[In] = {Listable, Protected}

In[1] = Null

In[2] = Clear[n30]

In[3] = n30[x_] := N[x, 30]

In[4] = a = 4

In[5] = n30[π]

In[6] = (Plot[-2 x, {x, -1, 1}];)

In[7] = Information[SetOpt*, LongForm → True]

In[8] = Information[\$Output, LongForm → True]

In[9] = Information[Pag*, LongForm → True]

In[10] = Information[PageWidth, LongForm → True]

In[11] = SetOptions[\$Output, PageWidth → 45]

In[12] = Options[\$Output]

In[13] = Information[In, LongForm → True]

In[14] = (linie = \$Line;)

In[15] = Information[Out, LongForm → True]

In[16] = linie

In[17] = (Plot[Sin[x], {x, 0, 50}];)

In[18] = (Plot[x², {x, 0, 1}];)

In[19] = Recall[1, 2, 3]

In[20] = Information[InString, LongForm → True]

In[21] = InString[{1, 2, 3, 4, 5, 6}]

In[22] = In[1]

In[23] = %1

In[24] = Information[In, LongForm → True]

Das Folgende gibt sehr viel Output (zum Drucken hier gesperrt):

■ Ce qui suit produit beaucoup d'output (ici défense d'imprimer):

In[25]:= (* ??Out *)

5.2.2. In ein File schreiben und wieder abrufen:

■ Ecrire dans un fichier et rappeler:

In[26]:= ?Save

Save["filename", symbol] appends definitions associated with the specified symbol to a file. Save["filename", "form"] appends definitions associated with all symbols whose names match the string pattern form. Save["filename", "context"] appends definitions associated with all symbols in the specified context. Save["filename", {object1, object2, ...}] appends definitions associated with several objects. Mehr...

**In[27]:= Save["C:\\work\\MathematicaData\\ASession.nb",
In, linie, (*Out*)]**

Syntax::com :
Warning: comma encountered with no adjacent expression; the expression will be treated as Null.
Mehr...

In[28]:= !!C:\\work\\MathematicaData\\ASession.nb

Attributes[In] = {Listable, Protected}

In[1] = Plot[Sin[Removed["x"]], {Removed["x"], 0, 6*Pi}, AspectRatio -> 1/2,
PlotLabel -> "Sin[x]", AxesLabel -> {"x", "y"},
AxesOrigin -> {2*Pi, 1/2}]

In[2] = Null

In[3] = (Plot[Sin[Removed["x"]], {Removed["x"], 0, 6*Pi}, AspectRatio -> 1/2,
PlotLabel -> "Sin[x]", AxesLabel -> {"x", "y"},
AxesOrigin -> {2*Pi, 1/2});)

In[4] = Null

In[5] = (Plot[2*Removed["x"]^3 - 7*Removed["x"]^2 - 17*Removed["x"] + 10,
{Removed["x"], -6, 6}];)

In[6] = Solve[2*Removed["x"]^3 - 7*Removed["x"]^2 - 17*Removed["x"] + 10 ==
0, Removed["x"]]

In[7] = (Plot[BesselJ[0, Removed["x"]], {Removed["x"], -6, 6}];)

In[8] = Solve[2*Removed["x"]^3 - 7*Removed["x"]^2 - 17*Removed["x"] + 10 ==
0, Removed["x"]]

In[9] = Remove[Removed["t"], Removed["x"], Removed["y"]]

In[10] = (Show[Plot[BesselJ[0, Removed["x"]], {Removed["x"], 0, 20},
DisplayFunction -> Identity],
Table[Graphics[{Dashing[{1/(10*Removed["t"])}]}, Thickness[0.01],
Evaluate[Line[{Removed["t"], BesselJ[0, Removed["t"]]},
Evaluate[{Removed["y"] /. FindRoot[BesselJ[0, Removed["y"]] == 0,
{Removed["y"], Removed["t"]}], 0}]]],
{Removed["t"], 1, 20, 3}], DisplayFunction -> \$DisplayFunction];)

In[11] = (Clear[Removed["f"]]; Removed["f"][Removed["x"]_] :=
1/(1 + Sin[Sqrt[Pi^2 + Removed["x"]^2]]); Removed["f"][Removed["x"]])

In[12] = (Removed["n"][Removed["x"]_] :=
Normal[Series[Removed["f"][Removed["x"]], {Removed["x"], 0, 8}]]);)

In[13] = (Removed["nTest"][Removed["x"]_] :=
Normal[Series[Removed["f"][Removed["x"]], {Removed["x"], 0, 3}]]);)

In[14] = Removed["nTest"][Removed["x"]]

In[15] = Print[N[Removed["n"][Removed["x"]]]]

```

In[16] = (Removed["a"] = 1; )

In[17] = (Plot[Evaluate[N[Removed["n"]][Removed["x"]]],
  Evaluate[{Removed["x"], -Removed["a"], Removed["a"]}],
  PlotStyle -> {{Thickness[0.01], Dashing[{0.04}]}}]; )

In[18] = (Removed["a"] = 1; )

In[19] = (Show[Plot[Removed["f"]][Removed["x"]],
  Evaluate[{Removed["x"], -Removed["a"], Removed["a"]}],
  DisplayFunction -> Identity, PlotStyle -> {GrayLevel[0.1]}],
  Plot[Evaluate[N[Removed["n"]][Removed["x"]]],
  Evaluate[{Removed["x"], -Removed["a"], Removed["a"]}],
  DisplayFunction -> Identity, PlotStyle ->
    {{Thickness[0.01], Dashing[{0.04}]}}], DisplayFunction ->
    $DisplayFunction]; )

In[20] = Null

In[21] = Null

In[22] = (Plot[Removed["x"]^2 + Cos[22*Removed["x"]],
  {Removed["x"], -5, 5}]; )

In[23] = (Plot[Removed["x"]^2 + Cos[22*Removed["x"]], {Removed["x"], -5, 5},
  PlotPoints -> 9]; )

In[24] = (Plot[Removed["x"]^2 + Cos[22*Removed["x"]], {Removed["x"], -5, 5},
  PlotPoints -> 70]; )

In[25] = (ParametricPlot[{Cos[4*Removed["t"]]*Cos[Removed["t"]],
  Cos[4*Removed["t"]]*Sin[Removed["t"]]}, {Removed["t"], 0, 2*Pi},
  AspectRatio -> Automatic]; )

In[26] = (ParametricPlot[{Cos[7*Removed["t"]]*Cos[3*Removed["t"]],
  Cos[7*Removed["t"]]*Sin[3*Removed["t"]]}, {Removed["t"], 0, 2*Pi},
  AspectRatio -> Automatic]; )

In[27] = (ParametricPlot[{Cos[7*Removed["t"]]*Cos[11*Removed["t"]],
  Cos[7*Removed["t"]]*Sin[11*Removed["t"]]}, {Removed["t"], 0, 2*Pi},
  AspectRatio -> Automatic]; )

In[28] = (Needs["Graphics`Polyhedra`"]; )

In[29] = (Show[Graphics3D[Icosahedron[]]]; )

In[30] = (Show[Graphics3D[Stellate[Icosahedron[], 3]], Boxed -> False]; )

In[31] = (Plot3D[Sin[Removed["x"]]*Removed["y"]], {Removed["x"], -5, 5},
  {Removed["y"], -5, 5}]; )

In[32] = (Plot3D[Sin[Removed["x"]]*Removed["y"]], {Removed["x"], -5, 5},
  {Removed["y"], -5, 5}, Lighting -> False]; )

In[33] = (Plot3D[Sin[Removed["x"]]*Removed["y"]], {Removed["x"], -5, 5},
  {Removed["y"], -5, 5}, Lighting -> True, ViewPoint -> {0, 0, 3}]; )

In[34] = (Plot3D[Sin[Removed["x"]]*Removed["y"]], {Removed["x"], -5, 5},
  {Removed["y"], -5, 5}, Lighting -> True, ViewPoint -> {0, 0, 10}]; )

In[35] = (Plot3D[Sin[Removed["x"]]*Removed["y"]], {Removed["x"], -5, 5},
  {Removed["y"], -5, 5}, Lighting -> True, ViewPoint -> {0, 3, 10}]; )

In[36] = (Plot3D[Sin[Removed["x"]]*Removed["y"]], {Removed["x"], -5, 5},
  {Removed["y"], -5, 5}, Lighting -> True, ViewPoint -> {2, -4, 6}]; )

In[37] = (ContourPlot[Sin[Removed["x"]]*Removed["y"]], {Removed["x"], -5, 5},
  {Removed["y"], -5, 5}]; )

In[38] = (DensityPlot[Sin[Removed["x"]]*Removed["y"]], {Removed["x"], -5, 5},
  {Removed["y"], -5, 5}]; )

In[39] = (ContourPlot[Removed["x"]^2 + 2*Removed["y"]^2,

```

```

    {Removed["x"], -5, 5}, {Removed["y"], -5, 5},
    AspectRatio -> Automatic; )

In[40] = Removed["t"] = Table[Prime[Removed["n"]], {Removed["n"], 10}]

In[41] = (ListPlot[Removed["t"], PlotStyle -> {PointSize[0.05]}]; )

In[42] = (ListPlot[Removed["t"], PlotStyle -> {PointSize[0.05]},
    PlotJoined -> True]; )

In[43] = Information["Fit", LongForm -> False]

In[44] = Removed["tfit"] = Fit[Removed["t"], {1, Removed["x"],
    Removed["x"]^2}, Removed["x"]]

In[45] = (Plot[Removed["tfit"], {Removed["x"], 0, 30}]; )

In[46] = (Show[ListPlot[Removed["t"], PlotStyle -> {PointSize[0.05]},
    DisplayFunction -> Identity], Plot[Removed["tfit"],
    {Removed["x"], 0, 10}, DisplayFunction -> Identity],
    DisplayFunction -> $DisplayFunction]; )

In[47] = (Removed["t"] = Table[Prime[Removed["n"]], {Removed["n"], 10}]; )

In[48] = Removed["rang"] = Range[Length[Removed["t"]]]

In[49] = Removed["tNew"] = Transpose[{Removed["rang"], Removed["t"]}]

In[50] = (Clear[Removed["tfit"]]; Removed["tfit"][Removed["x"]_] :=
    Fit[Removed["tNew"], {1, Removed["x"], Removed["x"]^2}, Removed["x"]]; )

In[51] = Removed["tfit"][Removed["x"]]

In[52] = Removed["tfit"][Removed["x"]] /. Removed["x"] -> 3

In[53] = Removed["te"] = Table[Prime[Removed["n"]] -
    (Removed["tfit"][Removed["x"]] /. Removed["x"] -> Removed["n"]),
    {Removed["n"], 10}]

In[54] = (Show[ListPlot[Removed["tNew"], PlotStyle -> {PointSize[0.05]},
    DisplayFunction -> Identity], ListPlot[Removed["te"],
    PlotStyle -> {PointSize[0.035]}, DisplayFunction -> Identity],
    Plot[Evaluate[Removed["tfit"][Removed["x"]] /. Removed["x"] ->
        Removed["n"], {Removed["n"], 0, 10}, DisplayFunction -> Identity],
    DisplayFunction -> $DisplayFunction]; )

In[55] = (Show[Graphics[{Circle[{-2, 1}, 1, {(3*Pi)/2, 2*Pi}],
    Circle[{0, 1}, 1, {Pi, 2*Pi}], Circle[{2, 1}, 1, {Pi, (3*Pi)/2}],
    Line[{{-2, 0}, {2, 0}], Line[{{-1, -0.5}, {-1, 1}],
    Line[{{1, -0.5}, {1, 1}}]], Graphics[
    Table[Circle[Removed["x"], -0.5, 0.1, {Pi, 2*Pi}],
    {Removed["x"], -2, 2, 0.2}], Graphics[
    {Circle[{0, -1.2}, 0.4, {Pi/6, (5*Pi)/6}], Circle[{0, -0.8}, 0.4,
    {(7*Pi)/6, (11*Pi)/6}], Point[{-0.2, -0.95}],
    Circle[{-0.3, -1}, 0.2, {-(Pi/4), Pi/4}],
    Line[{{0.35, -1}, {0.5, -0.85}, {0.5, -1.15}, {0.35, -1}}]],
    AspectRatio -> Automatic, PlotRange -> All]; )

In[56] = Null

In[57] = (Show[Graphics[{PointSize[0.04], Point[{-0.3, 0.1}],
    Point[{0.3, 0.1}], Disk[{0, 0}, 0.35, {(23*Pi)/16, (25*Pi)/16}],
    Line[{{-0.3, -0.5}, {0, -0.6}], Line[{{0, -0.6}, {0.3, -0.5}}],
    Circle[{0, 0}, 1}], AspectRatio -> Automatic, PlotRange -> All]; )

In[58] = Null

In[59] = (Show[Graphics[Table[{RGBColor[0, Removed["x"]/4.,
    1. - Removed["x"]/4.], Point[{Removed["x"], Cos[Removed["x"]^2] -
    Sin[Removed["x"]]}], {Removed["x"], 0, 4, 0.01}],
    Axes -> Automatic]; )

In[60] = Null

```

```

In[61] = Null
In[62] = Remove["Global`*"]
In[63] = Remove["Global`@"*"]
In[64] = Null
In[65] = Clear[n30]
In[66] = n30[x_] := N[x, 30]
In[67] = a = 4
In[68] = n30[Pi]
In[69] = (Plot[-2*x, {x, -1, 1}]; )
In[70] = Information["SetOpt*", LongForm -> True]
In[71] = Information["$Output", LongForm -> True]
In[72] = Information["Pag*", LongForm -> True]
In[73] = Information["PageWidth", LongForm -> True]
In[74] = SetOptions[$Output, PageWidth -> 45]
In[75] = Options[$Output]
In[76] = Information["In", LongForm -> True]
In[77] = (linie = $Line; )
In[78] = Information["Out", LongForm -> True]
In[79] = linie
In[80] = (Plot[Sin[x], {x, 0, 50}]; )
In[81] = (Plot[x^2, {x, 0, 1}]; )
In[82] = Recall[1, 2, 3]
In[83] = Information["InString", LongForm -> True]
In[84] = InString[{1, 2, 3, 4, 5, 6}]
In[85] = In[1]
In[86] = Out[1]
In[87] = Information["In", LongForm -> True]
In[88] = Null
In[89] = Save["C:\\work\\ASession.nb", In, linie, Null]

In /: In::usage = "In[n] is a global object that is assigned to have a \
delayed value of the nth input line."

linie = 77

Attributes[Null] = {Protected}
Attributes[In] = {Listable, Protected}

In[1] = Null
In[2] = Remove["Global`*"]
In[3] = Null

```

```

In[4] = Clear[n30]
In[5] = n30[x_] := N[x, 30]
In[6] = a = 4
In[7] = n30[Pi]
In[8] = (Plot[-2*x, {x, -1, 1}]; )
In[9] = Information["SetOpt*", LongForm -> True]
In[10] = Information["$Output", LongForm -> True]
In[11] = Information["Pag*", LongForm -> True]
In[12] = Information["PageWidth", LongForm -> True]
In[13] = SetOptions[$Output, PageWidth -> 45]
In[14] = Options[$Output]
In[15] = Information["In", LongForm -> True]
In[16] = (linie = $Line; )
In[17] = Information["Out", LongForm -> True]
In[18] = linie
In[19] = (Plot[Sin[x], {x, 0, 50}]; )
In[20] = (Plot[x^2, {x, 0, 1}]; )
In[21] = Recall[1, 2, 3]
In[22] = Information["InString", LongForm -> True]
In[23] = InString[{1, 2, 3, 4, 5, 6}]
In[24] = In[1]
In[25] = Out[1]
In[26] = Information["In", LongForm -> True]
In[27] = Null
In[28] = Save["C:\\work\\ASession.nb", In, linie, Null]

In /: In::usage = "In[n] is a global object that is assigned to have a \
delayed value of the nth input line."

linie = 16

Attributes[Null] = {Protected}
Attributes[In] = {Listable, Protected}

In[1] = Plot[Sin[Removed["x"]], {Removed["x"], 0, 6*Pi}, AspectRatio -> 1/2,
  PlotLabel -> "Sin[x]", AxesLabel -> {"x", "y"},
  AxesOrigin -> {2*Pi, 1/2}]

In[2] = Null

In[3] = (Plot[Sin[Removed["x"]], {Removed["x"], 0, 6*Pi}, AspectRatio -> 1/2,
  PlotLabel -> "Sin[x]", AxesLabel -> {"x", "y"},
  AxesOrigin -> {2*Pi, 1/2}]; )

In[4] = Null

In[5] = (Plot[2*Removed["x"]^3 - 7*Removed["x"]^2 - 17*Removed["x"] + 10,
  {Removed["x"], -6, 6}]; )

```

```

In[6] = Solve[2*Removed["x"]^3 - 7*Removed["x"]^2 - 17*Removed["x"] + 10 ==
0, Removed["x"]]

In[7] = (Plot[BesselJ[0, Removed["x"]], {Removed["x"], -6, 6}]; )

In[8] = Solve[2*Removed["x"]^3 - 7*Removed["x"]^2 - 17*Removed["x"] + 10 ==
0, Removed["x"]]

In[9] = Remove[Removed["t"], Removed["x"], Removed["y"]]

In[10] = (Show[Plot[BesselJ[0, Removed["x"]], {Removed["x"], 0, 20},
DisplayFunction -> Identity,
Table[Graphics[{Dashing[{1/(10*Removed["t"])}]}, Thickness[0.01],
Evaluate[Line[{Removed["t"], BesselJ[0, Removed["t"]}]}],
Evaluate[{Removed["y"] /. FindRoot[BesselJ[0, Removed["y"]] == 0,
{Removed["y"], Removed["t"]}], 0}]]]],
{Removed["t"], 1, 20, 3}], DisplayFunction -> $DisplayFunction]; )

In[11] = (Clear[Removed["f"]]; Removed["f"][Removed["x"]_] :=
1/(1 + Sin[Sqrt[Pi^2 + Removed["x"]^2]]); Removed["f"][Removed["x"]])

In[12] = (Removed["n"][Removed["x"]_] :=
Normal[Series[Removed["f"][Removed["x"]], {Removed["x"], 0, 8}]]; )

In[13] = (Removed["nTest"][Removed["x"]_] :=
Normal[Series[Removed["f"][Removed["x"]], {Removed["x"], 0, 3}]]; )

In[14] = Removed["nTest"][Removed["x"]]

In[15] = Print[N[Removed["n"][Removed["x"]]]]

In[16] = (Removed["a"] = 1; )

In[17] = (Plot[Evaluate[N[Removed["n"][Removed["x"]]]],
Evaluate[{Removed["x"], -Removed["a"], Removed["a"]}],
PlotStyle -> {{Thickness[0.01], Dashing[{0.04}]}]]; )

In[18] = (Removed["a"] = 1; )

In[19] = (Show[Plot[Removed["f"][Removed["x"]],
Evaluate[{Removed["x"], -Removed["a"], Removed["a"]}],
DisplayFunction -> Identity, PlotStyle -> {GrayLevel[0.1]}],
Plot[Evaluate[N[Removed["n"][Removed["x"]]]],
Evaluate[{Removed["x"], -Removed["a"], Removed["a"]}],
DisplayFunction -> Identity, PlotStyle ->
{{Thickness[0.01], Dashing[{0.04}]}], DisplayFunction ->
$DisplayFunction]; )

In[20] = Null

In[21] = Null

In[22] = (Plot[Removed["x"]^2 + Cos[22*Removed["x"]],
{Removed["x"], -5, 5}]; )

In[23] = (Plot[Removed["x"]^2 + Cos[22*Removed["x"]], {Removed["x"], -5, 5},
PlotPoints -> 9]; )

In[24] = (Plot[Removed["x"]^2 + Cos[22*Removed["x"]], {Removed["x"], -5, 5},
PlotPoints -> 70]; )

In[25] = (ParametricPlot[{Cos[4*Removed["t"]]*Cos[Removed["t"]],
Cos[4*Removed["t"]]*Sin[Removed["t"]]}, {Removed["t"], 0, 2*Pi},
AspectRatio -> Automatic]; )

In[26] = (ParametricPlot[{Cos[7*Removed["t"]]*Cos[3*Removed["t"]],
Cos[7*Removed["t"]]*Sin[3*Removed["t"]]}, {Removed["t"], 0, 2*Pi},
AspectRatio -> Automatic]; )

In[27] = (ParametricPlot[{Cos[7*Removed["t"]]*Cos[11*Removed["t"]],
Cos[7*Removed["t"]]*Sin[11*Removed["t"]]}, {Removed["t"], 0, 2*Pi},
AspectRatio -> Automatic]; )

```

```

In[28] = (Needs["Graphics`Polyhedra`"]; )
In[29] = (Show[Graphics3D[Icosahedron[]]]; )
In[30] = (Show[Graphics3D[Stellate[Icosahedron[]], 3]], Boxed -> False]; )
In[31] = (Plot3D[Sin[Removed["x"]*Removed["y"]], {Removed["x"], -5, 5},
  {Removed["y"], -5, 5}]; )
In[32] = (Plot3D[Sin[Removed["x"]*Removed["y"]], {Removed["x"], -5, 5},
  {Removed["y"], -5, 5}, Lighting -> False]; )
In[33] = (Plot3D[Sin[Removed["x"]*Removed["y"]], {Removed["x"], -5, 5},
  {Removed["y"], -5, 5}, Lighting -> True, ViewPoint -> {0, 0, 3}]; )
In[34] = (Plot3D[Sin[Removed["x"]*Removed["y"]], {Removed["x"], -5, 5},
  {Removed["y"], -5, 5}, Lighting -> True, ViewPoint -> {0, 0, 10}]; )
In[35] = (Plot3D[Sin[Removed["x"]*Removed["y"]], {Removed["x"], -5, 5},
  {Removed["y"], -5, 5}, Lighting -> True, ViewPoint -> {0, 3, 10}]; )
In[36] = (Plot3D[Sin[Removed["x"]*Removed["y"]], {Removed["x"], -5, 5},
  {Removed["y"], -5, 5}, Lighting -> True, ViewPoint -> {2, -4, 6}]; )
In[37] = (ContourPlot[Sin[Removed["x"]*Removed["y"]], {Removed["x"], -5, 5},
  {Removed["y"], -5, 5}]; )
In[38] = (DensityPlot[Sin[Removed["x"]*Removed["y"]], {Removed["x"], -5, 5},
  {Removed["y"], -5, 5}]; )
In[39] = (ContourPlot[Removed["x"]^2 + 2*Removed["y"]^2,
  {Removed["x"], -5, 5}, {Removed["y"], -5, 5},
  AspectRatio -> Automatic]; )
In[40] = Removed["t"] = Table[Prime[Removed["n"]], {Removed["n"], 10}]
In[41] = (ListPlot[Removed["t"], PlotStyle -> {PointSize[0.05]}]; )
In[42] = (ListPlot[Removed["t"], PlotStyle -> {PointSize[0.05]},
  PlotJoined -> True]; )
In[43] = Information["Fit", LongForm -> False]
In[44] = Removed["tfit"] = Fit[Removed["t"], {1, Removed["x"],
  Removed["x"]^2}, Removed["x"]]
In[45] = (Plot[Removed["tfit"], {Removed["x"], 0, 30}]; )
In[46] = (Show[ListPlot[Removed["t"], PlotStyle -> {PointSize[0.05]},
  DisplayFunction -> Identity], Plot[Removed["tfit"],
  {Removed["x"], 0, 10}, DisplayFunction -> Identity],
  DisplayFunction -> $DisplayFunction]; )
In[47] = (Removed["t"] = Table[Prime[Removed["n"]], {Removed["n"], 10}]; )
In[48] = Removed["rang"] = Range[Length[Removed["t"]]]
In[49] = Removed["tNew"] = Transpose[{Removed["rang"], Removed["t"]}]]
In[50] = (Clear[Removed["tfit"]]; Removed["tfit"][Removed["x"]_] :=
  Fit[Removed["tNew"], {1, Removed["x"], Removed["x"]^2}, Removed["x"]]; )
In[51] = Removed["tfit"][Removed["x"]]
In[52] = Removed["tfit"][Removed["x"]] /. Removed["x"] -> 3
In[53] = Removed["te"] = Table[Prime[Removed["n"]] -
  (Removed["tfit"][Removed["x"]] /. Removed["x"] -> Removed["n"]),
  {Removed["n"], 10}]
In[54] = (Show[ListPlot[Removed["tNew"], PlotStyle -> {PointSize[0.05]},
  DisplayFunction -> Identity], ListPlot[Removed["te"],
  PlotStyle -> {PointSize[0.035]}, DisplayFunction -> Identity],

```

```

Plot[Evaluate[Removed["tfit"][Removed["x"]]/. Removed["x"] ->
  Removed["n"]], {Removed["n"], 0, 10}, DisplayFunction -> Identity],
DisplayFunction -> $DisplayFunction]; )

In[55] = (Show[Graphics[{Circle[{-2, 1}, 1, {(3*Pi)/2, 2*Pi}],
  Circle[{0, 1}, 1, {Pi, 2*Pi}], Circle[{2, 1}, 1, {Pi, (3*Pi)/2}],
  Line[{{-2, 0}, {2, 0}], Line[{{-1, -0.5}, {-1, 1}],
  Line[{{1, -0.5}, {1, 1}}]}, Graphics[
  Table[Circle[{Removed["x"], -0.5}, 0.1, {Pi, 2*Pi}],
    {Removed["x"], -2, 2, 0.2}], Graphics[
    {Circle[{0, -1.2}, 0.4, {Pi/6, (5*Pi)/6}], Circle[{0, -0.8}, 0.4,
      {(7*Pi)/6, (11*Pi)/6}], Point[{-0.2, -0.95}],
      Circle[{-0.3, -1}, 0.2, {-(Pi/4), Pi/4}],
      Line[{{0.35, -1}, {0.5, -0.85}, {0.5, -1.15}, {0.35, -1}}]}],
  AspectRatio -> Automatic, PlotRange -> All]; )

In[56] = Null

In[57] = (Show[Graphics[{PointSize[0.04], Point[{-0.3, 0.1}],
  Point[{0.3, 0.1}], Disk[{0, 0}, 0.35, {(23*Pi)/16, (25*Pi)/16}],
  Line[{{-0.3, -0.5}, {0, -0.6}], Line[{{0, -0.6}, {0.3, -0.5}}],
  Circle[{0, 0}, 1}], AspectRatio -> Automatic, PlotRange -> All]; )

In[58] = Null

In[59] = (Show[Graphics[Table[{RGBColor[0, Removed["x"]/4.,
  1. - Removed["x"]/4.], Point[{Removed["x"], Cos[Removed["x"]^2] -
    Sin[Removed["x"]]}]}, {Removed["x"], 0, 4, 0.01}],
  Axes -> Automatic]; )

In[60] = Null

In[61] = Null

In[62] = Remove["Global`*"]

In[63] = Null

In[64] = Remove["Global`*"]

In[65] = Null

In[66] = Clear[Removed["n30"]]

In[67] = Removed["n30"][Removed["x"]_] := N[Removed["x"], 30]

In[68] = Removed["a"] = 4

In[69] = Removed["n30"][Pi]

In[70] = (Plot[-2*Removed["x"], {Removed["x"], -1, 1}]; )

In[71] = Information["SetOpt*", LongForm -> True]

In[72] = Information["$Output", LongForm -> True]

In[73] = Information["Pag*", LongForm -> True]

In[74] = Information["PageWidth", LongForm -> True]

In[75] = SetOptions[$Output, PageWidth -> 45]

In[76] = Options[$Output]

In[77] = Information["In", LongForm -> True]

In[78] = (Removed["linie"] = $Line; )

In[79] = Information["Out", LongForm -> True]

In[80] = Removed["linie"]

In[81] = (Plot[Sin[Removed["x"]], {Removed["x"], 0, 50}]; )

```

```

In[82] = (Plot[Removed["x"]^2, {Removed["x"], 0, 1}]; )
In[83] = Removed["Recall"][1, 2, 3]
In[84] = Information["InString", LongForm -> True]
In[85] = InString[{1, 2, 3, 4, 5, 6}]
In[86] = In[1]
In[87] = Out[1]
In[88] = Information["In", LongForm -> True]
In[89] = Null
In[90] = Information["Save", LongForm -> False]
In[91] = Save["C:\\work\\ASession.nb", In, Removed["linie"], Null]
In[92] = Null
In[93] = Information["Edit", LongForm -> True]
In[94] = Information["EditDefinition", LongForm -> True]
In[95] = Information["*Edit*", LongForm -> False]
In[96] = Information["EditIn", LongForm -> True]
In[97] = Information["*Edit*", LongForm -> True]
In[98] = Removed["x"]^6 + 12*Removed["x"]^5*Removed["y"] +
        60*Removed["x"]^4*Removed["y"]^2 + 160*Removed["x"]^3*Removed["y"]^3 +
        240*Removed["x"]^2*Removed["y"]^4 + 192*Removed["x"]*Removed["y"]^5 +
        64*Removed["y"]^6
In[99] = Null
In[100] = Clear[Removed["n30"]]
In[101] = Removed["n30"][Removed["x"]_] := N[Removed["x"], 30]
In[102] = Null
In[103] = Clear[Removed["a"]]
In[104] = Removed["a"] = 4
In[105] = Information["n30", LongForm -> True]
In[106] = Information["a", LongForm -> True]
In[107] = Series[Csc[Removed["x"]], {Removed["x"], 0, 7}]
In[108] = Information["Series", LongForm -> False]
In[109] = Information["Csc", LongForm -> False]
In[110] = Information["X* Z*", LongForm -> False]
In[111] = Names["W*"]
In[112] = Names["A*"]
In[113] = Names["*"]
In[114] = Removed["f"][Removed["x"]_] := Sin[Removed["x"]]*Cos[2*Removed["x"]]
In[115] = Removed["f"][Removed["x"]]
In[116] = Removed["f"][Pi]

```

```

In[117] = (Plot[Removed["f"][Removed["x"]], {Removed["x"], 0, 10}]; )
In[118] = (Removed["f1"][Removed["x"]_] := Sin[2*Removed["x"]]*
Cos[3*Removed["x"]^2]; )
In[119] = (Plot[Removed["f1"][Removed["x"]], {Removed["x"], 0, 10}]; )
In[120] = (Removed["g"][Removed["x"]] := Sin[2*Removed["x"]]*
Cos[3*Removed["x"]^2]; )
In[121] = (Plot[Removed["g"][Removed["x"]], {Removed["x"], 0, 10}]; )
In[122] = (Removed["g1"][Removed["x"]_] = Sin[2*Removed["x"]]*
Cos[3*Removed["x"]^2]; )
In[123] = (Plot[Removed["g1"][Removed["x"]], {Removed["x"], 0, 10}]; )
In[124] = (Removed["g2"][Removed["x"]] = Sin[2*Removed["x"]]*
Cos[3*Removed["x"]^2]; )
In[125] = (Plot[Removed["g2"][Removed["x"]], {Removed["x"], 0, 10}]; )
In[126] = N[Sqrt[2]/2]
In[127] = N[Sqrt[2]/2]
In[128] = Names["W*"]
In[129] = Length[Names["W*"]]
In[130] = Removed["x"] = Pi/2
In[131] = Sin[Removed["x"]]
In[132] = N[Sin[Sin[Removed["x"]]]]
In[133] = N[Sin[Sin[Sin[Removed["x"]]]]]
In[134] = N[Sin[Sin[Sin[Sin[Sin[Removed["x"]]]]]]]
In[135] = N[Sin[Sin[Sin[Sin[Sin[Removed["x"]]]]]]]
In[136] = Sin[4.08]
In[137] = (Sin[3.96]; )
In[138] = %
In[139] = (Removed["a"] = 1; Removed["b"] = 2; Removed["c"] = 3;
Removed["d"] = 4)
In[140] = (Removed["a"] = 1; Removed["b"] = 2; Removed["c"] = 3;
Removed["d"] = 4; )
In[141] = (Removed["a"] = 1; Removed["b"] = 2; Print[Removed["b"]];
Removed["c"] = 3; Removed["d"] = 4; )
In[142] = (Removed["a"] = 1; Removed["b"] = 2; Print[Removed["b"]];
Removed["c"] = 3; Removed["d"] = 4)
In[143] = (Removed["a"] = 1; Removed["b"] = 2; Plot[Removed["x"],
{Removed["x"], 0, 1}]; Removed["c"] = 3; Removed["d"] = 4)
In[144] = Timing[N[Pi, 500]]
In[145] = Timing[N[Pi, 500]; ]
In[146] = Timing[N[Pi, 2000]; ]
In[147] = Timing[Plot[Sin[Removed["x"]], {Removed["x"], 0, 50}]]
In[148] = Timing[Plot[Sin[Removed["x"]], {Removed["x"], 0, 50}]; ]

```

```
In[149] = 5000!
In[150] = Timing[1000!]
In[151] = Information["$*", LongForm -> True]
In[152] = Information["$Line", LongForm -> True]
In[153] = $Line
In[154] = $Version
In[155] = $VersionNumber
In[156] = Removed["$Letters"]
In[157] = Information["/", LongForm -> True]
In[158] = Alias["/"]
In[159] = N[2/3]
In[160] = N[2/3]
In[161] = 2/3
In[162] = Divide @@ {2, 3}
In[163] = Information["Apply", LongForm -> True]
In[164] = Null
In[165] = Remove["Global`*"]
In[166] = Null
In[167] = Clear[n30]
In[168] = n30[x_] := N[x, 30]
In[169] = a = 4
In[170] = n30[Pi]
In[171] = (Plot[-2*x, {x, -1, 1}]; )
In[172] = Information["SetOpt*", LongForm -> True]
In[173] = Information["$Output", LongForm -> True]
In[174] = Information["Pag*", LongForm -> True]
In[175] = Information["PageWidth", LongForm -> True]
In[176] = SetOptions[$Output, PageWidth -> 45]
In[177] = Options[$Output]
In[178] = Information["In", LongForm -> True]
In[179] = (linie = $Line; )
In[180] = Information["Out", LongForm -> True]
In[181] = linie
In[182] = (Plot[Sin[x], {x, 0, 50}]; )
In[183] = (Plot[x^2, {x, 0, 1}]; )
In[184] = Recall[1, 2, 3]
```

```
In[185] = Information["InString", LongForm -> True]
In[186] = InString[{1, 2, 3, 4, 5, 6}]
In[187] = In[1]
In[188] = Out[1]
In[189] = Information["In", LongForm -> True]
In[190] = Null
In[191] = Information["Save", LongForm -> False]
In[192] = Save["C:\\work\\MathematicaData\\\\ASession.nb", In, linie, Null]

In /: In::usage = "In[n] is a global object that is assigned to have a \
delayed value of the nth input line."

linie = 179

Attributes[Null] = {Protected}
Attributes[In] = {Listable, Protected}

In[1] = Null
In[2] = Clear[n30]
In[3] = n30[x_] := N[x, 30]
In[4] = a = 4
In[5] = n30[Pi]
In[6] = (Plot[-2*x, {x, -1, 1}]; )
In[7] = Information["SetOpt*", LongForm -> True]
In[8] = Information["$Output", LongForm -> True]
In[9] = Information["Pag*", LongForm -> True]
In[10] = Information["PageWidth", LongForm -> True]
In[11] = SetOptions[$Output, PageWidth -> 45]
In[12] = Options[$Output]
In[13] = Information["In", LongForm -> True]
In[14] = (linie = $Line; )
In[15] = Information["Out", LongForm -> True]
In[16] = linie
In[17] = (Plot[Sin[x], {x, 0, 50}]; )
In[18] = (Plot[x^2, {x, 0, 1}]; )
In[19] = Recall[1, 2, 3]
In[20] = Information["InString", LongForm -> True]
In[21] = InString[{1, 2, 3, 4, 5, 6}]
In[22] = In[1]
In[23] = Out[1]
In[24] = Information["In", LongForm -> True]
In[25] = Null
```

```

In[26] = Information["Save", LongForm -> False]

In[27] = Save["C:\\work\\MathematicaData\\ASession.nb", In, linie, Null]

In /: In::usage = "In[n] is a global object that is assigned to have a \
delayed value of the nth input line."

linie = 14

Attributes[Null] = {Protected}

```

5.3. Zum Editor

■ Quant à l'éditeur

Hier für "NeXT"! (Für andere Editoren ev. anders, vgl. *Mathematica*, a Practical Approach von Nancy Blachman oder Literatur)

■ Ici seulement pour "NeXT"! (Pour d'autres éditeurs voir *Mathematica*, a Practical Approach de Nancy Blachman ou littérature)

Einige Edit-Funktionen:

■ Quelques fonctions Edit:

In[29]:= ??Edit

Edit[expr___] lets you edit the expressions expr.

Attributes[Edit] = {Protected, ReadProtected}

In[30]:= ??EditDefinition

EditDefinition[syms___] lets you edit the rules attached to the symbols syms.

Attributes[EditDefinition] = {HoldAll, Protected, ReadProtected}

In[31]:= ??*Edit*

System`

CellEditDuplicate	EditCellTagsSettings
Edit	EditDefinition
Editable	EditIn
EditButtonSettings	OutputMathEditExpression

In[32]:= ??EditIn

EditIn[n__Integer] lets you edit input lines n. EditIn[] edits the previous input line.

Attributes[EditIn] = {Protected, ReadProtected}

*In[33]:= ??*Edit**

System`

CellEditDuplicate	EditCellTagsSettings
Edit	EditDefinition
Editable	EditIn
EditButtonSettings	OutputMathEditExpression

Beispiele: ■ Exemples

In[34]:= Edit[Expand[(x+2y)^6]]

Out[34]= $x^6 + 12 x^5 y + 60 x^4 y^2 + 160 x^3 y^3 + 240 x^2 y^4 + 192 x y^5 + 64 y^6$

Oder: ■ Ou:

In[35]:= EditDefinition[n30]

In[38]:= EditDefinition[a]

Out[40]= 4

Funktioniert der Befehl auf NeXT?

■ L'ordre fonctionne-t-il sur NeXT?

In[41]:= ??n30

Global`n30

n30[x_] := N[x, 30]

In[42]:= ??a

Global`a

a = 4

5.4. Zu On-Line Help

■ Quant à On-Line Help

Ein Trick

■ Un truc

Weisst Du beim Schreiben innerhalb eines Befehls nicht mehr weiter, so kannst Du in der selben Zelle die Help-Funktion benutzen.

■ Si tu ne t'en sors plus en écrivant à l'intérieur d'un ordre, tu peux utiliser la fonction Help dans la même cellule.

Beispiel: ■ Exemple:

```
In[43]:= Series[Csc[x], {x, 0, 7}]
```

```
Out[43]= 1/x + x/6 + 7 x^3/360 + 31 x^5/15120 + 127 x^7/604800 + O[x]^8
```

```
In[44]:= ?Series
```

Series[f, {x, x0, n}] generates a power series expansion for f about the point x = x0 to order (x - x0)^n. Series[f, {x, x0, nx}, {y, y0, ny}] successively finds series expansions with respect to y, then x. Mehr...

Natürlich kannst Du auch eine neue Zelle machen:

■ Naturellement tu peux faire une nouvelle cellule:

```
In[45]:= ?Csc
```

Csc[z] gives the cosecant of z. Mehr...

5.5. Ein Blank kann "oder" bedeuten...

■ Un "blanc" peut signifier "ou":

Das Problem besteht nur bei Version 1.2.:

■ Le problème existe seulement pour la version 1.2.:

```
In[46]:= ?X* Z*
```

System`

XMLElement XMLObject Xor

System`

ZeroTest ZeroWidthTimes Zeta ZTransform

5.6. Symbollisten erzeugen:

■ Générer des listes de symboles

5.6.1. Ein Beispiel, das alles sagt:

■ Un exemple qui dit tout:

```
In[47]:= Names["w*"]
```

```
Out[47]= {WeierstrassHalfPeriods, WeierstrassInvariants, WeierstrassP, WeierstrassPPrime,
WeierstrassSigma, WeierstrassZeta, Which, While, White, Whitespace,
WhitespaceCharacter, WindowClickSelect, WindowElements, WindowFloating,
WindowFrame, WindowFrameElements, WindowMargins, WindowMovable, WindowSize,
WindowTitle, WindowToolbars, WindowWidth, With, Word, WordBoundary, WordCharacter,
WordSearch, WordSeparators, WorkingPrecision, Write, WriteString, WynnDegree}
```

Oder: ■ Ou:

```
In[48]:= Names["A*"]
```

```
Out[48]= {Abort, AbortProtect, Above, Abs, AbsoluteDashing, AbsoluteOptions,
  AbsolutePointSize, AbsoluteThickness, AbsoluteTime, AbsoluteTiming,
  AccountingForm, Accuracy, AccuracyGoal, Active, ActiveItem, AddOnHelpPath,
  AddTo, AdjustmentBox, AdjustmentBoxOptions, After, AiryAi, AiryAiPrime,
  AiryBi, AiryBiPrime, AlgebraicRules, AlgebraicRulesData, Algebraics, Alias,
  AlignmentMarker, All, AllowInlineCells, AllowScriptLevelChange, Alternatives,
  AmbientLight, Analytic, AnchoredSearch, And, AnimationCycleOffset,
  AnimationCycleRepetitions, AnimationDirection, AnimationDisplayTime, Apart,
  ApartSquareFree, AppellF1, Append, AppendTo, Apply, ArcCos, ArcCosh, ArcCot,
  ArcCoth, ArcCsc, ArcCsch, ArcSec, ArcSech, ArcSin, ArcSinh, ArcTan, ArcTanh,
  Arg, ArgumentCountQ, ArithmeticGeometricMean, Array, ArrayDepth, ArrayPlot,
  ArrayQ, ArrayRules, AspectRatio, AspectRatioFixed, Assuming, Assumptions,
  AtomQ, Attributes, AutoDelete, AutoEvaluateEvents, AutoGeneratedPackage,
  AutoIndent, AutoIndentSpacings, AutoItalicWords, AutoloadPath,
  Automatic, AutoOpenNotebooks, AutoOpenPalettes, AutoScroll, AutoSpacing,
  AutoStyleOptions, Axes, AxesEdge, AxesLabel, AxesOrigin, AxesStyle, Axis}
```

Das Problem besteht nur bei Version 1.2.:

■ Le problème existe seulement pour la version 1.2.:

5.6.2. Jetzt ganz *Mathematica* sowie alle bisherigen eigenen Definitionen auf einmal:

■ Maintenant tout *Mathematica* ainsi que toutes les propres définitions jusqu'à présent à la fois:

```
In[49]:= Names["*"]
```

```
Out[49]= {a, Abort, AbortProtect, Above, Abs, AbsoluteDashing, AbsoluteOptions,
  AbsolutePointSize, AbsoluteThickness, AbsoluteTime, AbsoluteTiming,
  AccountingForm, Accuracy, AccuracyGoal, Active, ActiveItem, AddOnHelpPath,
  AddTo, AdjustmentBox, AdjustmentBoxOptions, After, AiryAi, AiryAiPrime,
  AiryBi, AiryBiPrime, AlgebraicRules, AlgebraicRulesData, Algebraics, Alias,
  AlignmentMarker, All, AllowInlineCells, AllowScriptLevelChange, Alternatives,
  AmbientLight, Analytic, AnchoredSearch, And, AnimationCycleOffset,
  AnimationCycleRepetitions, AnimationDirection, AnimationDisplayTime, Apart,
  ApartSquareFree, AppellF1, Append, AppendTo, Apply, ArcCos, ArcCosh, ArcCot,
  ArcCoth, ArcCsc, ArcCsch, ArcSec, ArcSech, ArcSin, ArcSinh, ArcTan, ArcTanh,
  Arg, ArgumentCountQ, ArithmeticGeometricMean, Array, ArrayDepth, ArrayPlot,
  ArrayQ, ArrayRules, AspectRatio, AspectRatioFixed, Assuming, Assumptions,
  AtomQ, Attributes, AutoDelete, AutoEvaluateEvents, AutoGeneratedPackage,
  AutoIndent, AutoIndentSpacings, AutoItalicWords, AutoloadPath, Automatic,
  AutoOpenNotebooks, AutoOpenPalettes, AutoScroll, AutoSpacing, AutoStyleOptions,
  Axes, AxesEdge, AxesLabel, AxesOrigin, AxesStyle, Axis, Background,
  BackgroundTasksSettings, Backsubstitution, Backward, BaseForm, Baseline,
  Before, Begin, BeginDialogPacket, BeginFrontEndInteractionPacket, BeginPackage,
  Below, BernoulliB, BesselI, BesselJ, BesselK, BesselY, Beta, BetaRegularized,
  BezoutMatrix, BinaryFormat, BinaryGet, BinaryRead, BinaryReadList,
  BinaryWrite, Binomial, BitAnd, BitNot, BitOr, BitXor, Black, Blank, BlankForm,
  BlankNullSequence, BlankSequence, Block, Blue, Boole, Booleans, Bottom, Bounds,
  Box, BoxBaselineShift, BoxData, BoxDimensions, Boxed, BoxFormFormatTypes,
  BoxFrame, BoxMargins, BoxRatios, BoxRegion, BoxStyle, Break, Brown, Buchberger,
```

Button, ButtonBox, ButtonBoxOptions, ButtonCell, ButtonContents, ButtonData, ButtonEvaluator, ButtonExpandable, ButtonFrame, ButtonFunction, ButtonMargins, ButtonMinHeight, ButtonNote, ButtonNotebook, ButtonSource, ButtonStyle, ButtonStyleMenuListing, Byte, ByteCount, ByteOrdering, C, CallPacket, Cancel, CarmichaelLambda, Cases, Catalan, Catch, Ceiling, Cell, CellAutoOverwrite, CellBaseline, CellBoundingBox, CellBracketOptions, CellContents, CellDingbat, CellEditDuplicate, CellElementsBoundingBox, CellElementSpacings, CellEvaluationDuplicate, CellFrame, CellFrameColor, CellFrameLabelMargins, CellFrameLabels, CellFrameMargins, CellGroup, CellGroupData, CellGrouping, CellGroupingRules, CellHorizontalScrolling, CellLabel, CellLabelAutoDelete, CellLabelMargins, CellLabelPositioning, CellMargins, CellObject, CellOpen, CellPasswords, CellPrint, CellSize, CellStyle, CellTags, CellularAutomaton, Center, CForm, Character, CharacterEncoding, CharacterEncodingsPath, CharacteristicPolynomial, CharacterRange, Characters, ChebyshevT, ChebyshevU, Check, CheckAbort, CheckAll, CholeskyDecomposition, Chop, Circle, Clear, ClearAll, ClearAttributes, ClebschGordan, Clip, ClipboardNotebook, ClipFill, Close, Closed, ClosingAutoSave, CMYKColor, Coefficient, CoefficientArrays, CoefficientDomain, CoefficientList, CofactorExpansion, Collect, ColonForm, ColorFunction, ColorFunctionScaling, ColorOutput, ColorRules, ColorSelectorSettings, Column, ColumnAlignments, ColumnForm, ColumnLines, ColumnsEqual, ColumnSpacings, ColumnWidths, CommonDefaultFormatTypes, Compile, Compiled, CompiledFunction, CompileOptimizations, Complement, CompletionsListPacket, Complex, Complexes, ComplexExpand, ComplexInfinity, ComplexityFunction, Compose, ComposeList, ComposeSeries, Composition, CompoundExpression, Condition, ConfigurationPath, Conjugate, ConjugateTranspose, Connect, ConsoleMessage, ConsoleMessagePacket, ConsolePrint, Constant, Constants, ConstrainedMax, ConstrainedMin, ContentsBoundingBox, Context, Contexts, ContextToFilename, ContextToFile, Continuation, Continue, ContinuedFraction, ContourGraphics, ContourLines, ContourPlot, Contours, ContourShading, ContourSmoothing, ContourStyle, ConversionOptions, ConversionRules, ConvertToBitmapPacket, ConvertToPostScript, ConvertToPostScriptPacket, Copyable, CopyDirectory, CopyFile, Cos, Cosh, CoshIntegral, CosIntegral, Cot, Coth, Count, CounterAssignments, CounterBox, CounterBoxOptions, CounterEvaluator, CounterFunction, CounterIncrements, CounterStyle, CounterStyleMenuListing, CreateDirectory, CreatePalettePacket, Cross, Csc, Csch, Cubics, Cuboid, CurrentlySpeakingPacket, Cyan, Cyclotomic, CylindricalDecomposition, D, DampingFactor, Dashing, DataRange, Date, Debug, DebugTag, Decimal, DeclarePackage, Decompose, Decrement, DedekindEta, Default, DefaultColor, DefaultDuplicateCellStyle, DefaultFont, DefaultFontProperties, DefaultFormatType, DefaultFormatTypeForStyle, DefaultInlineFormatType, DefaultInputFormatType, DefaultNaturalLanguage, DefaultNewCellStyle, DefaultNewInlineCellStyle, DefaultNotebook, DefaultOutputFormatType, DefaultStyleDefinitions, DefaultTextFormatType, DefaultTextInlineFormatType, DefaultValues, DefineExternal, Definition, Degree, DegreeLexicographic, DegreeReverseLexicographic, Deletable, Delete, DeleteCases, DeleteContents, DeleteDirectory, DeleteFile, DeletionWarning, DelimiterFlashTime, DelimiterMatching, Delimiters, Denominator, DensityGraphics, DensityPlot, DependentVariables, Depth, Derivative, Det, DiacriticalPositioning, DiagonalMatrix, Dialog, DialogIndent, DialogLevel, DialogProlog, DialogSymbols, DifferenceOrder, DigitBlock, DigitCharacter, DigitCount, DigitQ, Dimensions, DiracDelta, DirectedInfinity, Direction, Directory, DirectoryName, DirectoryStack, DisableConsolePrintPacket, DiscreteDelta, Disk, Dispatch, Display, DisplayAnimation, DisplayEndPacket, DisplayFlushImagePacket, DisplayForm, DisplayFunction, DisplayPacket, DisplayRules, DisplaySetSizePacket, DisplayString, Distribute, Divide, DivideBy, DivisionFreeRowReduction, Divisors, DivisorSigma, Do, DOSTextFormat, Dot, DoubleExponential, DoublyInfinite, Down, DownValues, DragAndDrop, DrawHighlighted, Drop, DSolve, Dt, DualLinearProgramming, DumpGet, DumpSave, E, EdgeForm, Edit, Editable, EditButtonSettings, EditCellTagsSettings, EditDefinition, EditIn, Eigensystem,

Eigenvalues, Eigenvectors, Element, Eliminate, EliminationOrder, EllipticE, EllipticExp, EllipticExpPrime, EllipticF, EllipticK, EllipticLog, EllipticNomeQ, EllipticPi, EllipticReducedHalfPeriods, EllipticTheta, EllipticThetaPrime, Empty, EnableConsolePrintPacket, Encode, Encoding, End, EndAdd, EndDialogPacket, EndFrontEndInteractionPacket, EndOfFile, EndOfLine, EndOfString, EndPackage, EngineeringForm, Enter, EnterExpressionPacket, EnterTextPacket, Environment, Epilog, Equal, EqualColumns, EqualRows, EquatedTo, Erf, Erfc, Erfi, ErrorBox, ErrorBoxOptions, ErrorNorm, ErrorPacket, ErrorsDialogSettings, EulerE, EulerGamma, EulerPhi, Evaluatable, Evaluate, EvaluatePacket, EvaluationCell, EvaluationCompletionAction, EvaluationMonitor, EvaluationNotebook, Evaluator, EvaluatorNames, EvenQ, EventEvaluator, ExactNumberQ, ExactRootIsolation, Except, ExcludedForms, Exists, Exit, ExitDialog, Exp, Expand, ExpandAll, ExpandDenominator, ExpandNumerator, ExpIntegralE, ExpIntegralEi, Exponent, ExponentFunction, ExponentPosition, ExponentStep, Export, ExportAutoReplacements, ExportPacket, ExportString, Expression, ExpressionPacket, ExpToTrig, ExtendedGCD, Extension, ExternalCall, ExternalDataCharacterEncoding, Extract, FaceForm, FaceGrids, Factor, FactorComplete, Factorial, Factorial2, FactorInteger, FactorList, FactorSquareFree, FactorSquareFreeList, FactorTerms, FactorTermsList, Fail, False, FEDisableConsolePrintPacket, FEEEnableConsolePrintPacket, Fibonacci, File, FileByteCount, FileDate, FileFormat, FileInformation, FileName, FileNameDialogSettings, FileNames, FileType, Find, FindFit, FindInstance, FindList, FindMaximum, FindMinimum, FindRoot, FindSettings, First, Fit, FitAll, FixedPoint, FixedPointList, Flat, Flatten, FlattenAt, Floor, FlushPrintOutputPacket, Fold, FoldList, Font, FontColor, FontFamily, FontForm, FontName, FontPostScriptName, FontProperties, FontReencoding, FontSize, FontSlant, FontSubstitutions, FontTracking, FontVariations, FontWeight, For, ForAll, Format, FormatRules, FormatType, FormatTypeAutoConvert, FormatValues, FormBox, FormBoxOptions, FortranForm, Forward, ForwardBackward, Fourier, FourierCosTransform, FourierParameters, FourierSinTransform, FourierTransform, FractionalPart, FractionBox, FractionBoxOptions, FractionLine, Frame, FrameBox, FrameBoxOptions, FrameLabel, FrameStyle, FrameTicks, FreeQ, FresnelC, FresnelS, FromCharacterCode, FromContinuedFraction, FromDate, FromDigits, FrontEndExecute, FrontEndObject, FrontEndStackSize, FrontEndToken, FrontEndTokenExecute, FrontEndVersion, Full, FullAxes, FullDefinition, FullForm, FullGraphics, FullOptions, FullSimplify, Function, FunctionExpand, FunctionInterpolation, Gamma, GammaRegularized, GaussianIntegers, GaussKronrod, GaussPoints, GCD, GegenbauerC, General, GenerateBitmapCaches, GenerateConditions, GeneratedCell, GeneratedParameters, Generic, Get, GetBoundingBoxSizePacket, GetContext, GetFileName, GetFrontEndOptionsDataPacket, GetLinebreakInformationPacket, GetMenusPacket, GetPageBreakInformationPacket, Glaisher, GlobalPreferences, GlobalSession, GoldenRatio, Goto, Gradient, Graphics, Graphics3D, GraphicsArray, GraphicsData, GraphicsGrouping, GraphicsSpacing, Gray, GrayLevel, Greater, GreaterEqual, Green, Grid, GridBaseline, GridBox, GridBoxOptions, GridCreationSettings, GridDefaultElement, GridFrame, GridFrameMargins, GridLines, GroebnerBasis, GroupPageBreakWithin, HarmonicNumber, Hash, HashTable, Head, HeadCompose, Heads, HeldPart, HelpBrowserLookup, HelpBrowserNotebook, HelpBrowserSettings, HermiteH, HessenbergDecomposition, Hessian, HiddenSurface, Hold, HoldAll, HoldAllComplete, HoldComplete, HoldFirst, HoldForm, HoldPattern, HoldRest, HomeDirectory, Horizontal, HorizontalForm, HorizontalScrollPosition, HTMLSave, Hue, Hypergeometric0F1, Hypergeometric0F1Regularized, Hypergeometric1F1, Hypergeometric1F1Regularized, Hypergeometric2F1, Hypergeometric2F1Regularized, HypergeometricPFQ, HypergeometricPFQRegularized, HypergeometricU, HyperlinkCreationSettings, Hyphenation, HyphenationOptions, I, Identity, IdentityMatrix, If, IgnoreCase, Im, ImageCache, ImageCacheValid, ImageMargins, ImageOffset, ImageRangeCache, ImageRegion, ImageResolution, ImageRotated, ImageSize, Implies, Import, ImportAutoReplacements, ImportString, In, IncludeFileExtension, IncludeSingularTerm, Increment, Indent, IndentingNewlineSpacings,

IndentMaxFraction, Indeterminate, IndexCreationOptions, Inequality,
 InexactNumberQ, InexactNumbers, Infinity, Infix, Information, Inherited,
 InitializationCell, InitializationCellEvaluation, InitializationCellWarning,
 InlineCounterAssignments, InlineCounterIncrements, InlineRules, Inner, Input,
 InputAliases, InputAutoFormat, InputAutoReplacements, InputForm, InputGrouping,
 InputNamePacket, InputNotebook, InputPacket, InputSettings, InputStream,
 InputString, InputStringPacket, InputToBoxFormPacket, InputToInputForm,
 InputToStandardForm, Insert, InsertionPointObject, Install, InString, Integer,
 IntegerDigits, IntegerExponent, IntegerPart, IntegerQ, Integers, Integrate,
 Interactive, Interlaced, InterpolatingFunction, InterpolatingPolynomial,
 Interpolation, InterpolationOrder, InterpolationPoints, InterpolationPrecision,
 InterpretationBox, InterpretationBoxOptions, InterpretTemplate, Interrupt,
 InterruptSettings, Intersection, Interval, IntervalIntersection, IntervalMemberQ,
 IntervalUnion, Inverse, InverseBetaRegularized, InverseEllipticNomeQ,
 InverseErf, InverseErfc, InverseFourier, InverseFourierCosTransform,
 InverseFourierSinTransform, InverseFourierTransform, InverseFunction,
 InverseFunctions, InverseGammaRegularized, InverseJacobiCD, InverseJacobiCN,
 InverseJacobiCS, InverseJacobiDC, InverseJacobiDN, InverseJacobiDS,
 InverseJacobiNC, InverseJacobiND, InverseJacobiNS, InverseJacobiSC,
 InverseJacobiSD, InverseJacobiSN, InverseLaplaceTransform, InverseSeries,
 InverseWeierstrassP, InverseZTransform, JacobiAmplitude, Jacobian, JacobiCD,
 JacobiCN, JacobiCS, JacobiDC, JacobiDN, JacobiDS, JacobiNC, JacobiND,
 JacobiNS, JacobiP, JacobiSC, JacobiSD, JacobiSN, JacobiSymbol, JacobiZeta,
 Join, JordanDecomposition, K, Khinchin, KleinInvariantJ, KroneckerDelta,
 Label, LaguerreL, Language, LanguageCategory, LaplaceTransform, Larger, Last,
 LatticeReduce, Launch, LayoutInformation, LCM, LeafCount, Left, LegendreP,
 LegendreQ, LegendreType, Length, LerchPhi, Less, LessEqual, LetterCharacter,
 LetterQ, Level, Lexicographic, LicenseID, Lighting, LightSources, Limit,
 LimitsPositioning, LimitsPositioningTokens, Line, LinearProgramming,
 LinearSolve, LinearSolveFunction, LineBreak, LinebreakAdjustments,
 LineBreakWithin, LineForm, LineIndent, LineSpacing, LineWrapParts, Linie,
 LinkActivate, LinkClose, LinkConnect, LinkConnectedQ, LinkCreate, LinkError,
 LinkFlush, LinkHost, LinkInterrupt, LinkLaunch, LinkMode, LinkObject, LinkOpen,
 LinkOptions, LinkPatterns, LinkProtocol, LinkRead, LinkReadHeld, LinkReadyQ,
 Links, LinkWrite, LinkWriteHeld, List, Listable, ListContourPlot, ListConvolve,
 ListCorrelate, ListDensityPlot, Listen, ListInterpolation, ListPlay,
 ListPlot, ListPlot3D, ListQ, Literal, LiteralSearch, Locked, Log, LogGamma,
 LogicalExpand, LogIntegral, LongestMatch, LongForm, Loopback, LowerCaseQ,
 LUBackSubstitution, LUDecomposition, MachineID, MachineName, MachineNumberQ,
 MachinePrecision, MacintoshSystemPageSetup, Magenta, Magnification, MainSolve,
 MakeBoxes, MakeExpression, MakeRules, MantissaExponent, Manual, Map, MapAll,
 MapAt, MapIndexed, MapThread, MatchLocalNameQ, MatchLocalNames, MatchQ,
 MathematicaNotation, MathieuC, MathieuCharacteristicA, MathieuCharacteristicB,
 MathieuCharacteristicExponent, MathieuCPrime, MathieuS, MathieuSPrime,
 MathMLForm, MathMLText, MatrixExp, MatrixForm, MatrixPower, MatrixQ, MatrixRank,
 Max, MaxBend, Maximize, MaxIterations, MaxMemoryUsed, MaxPlotPoints, MaxPoints,
 MaxRecursion, MaxStepFraction, MaxSteps, MaxStepSize, Mean, Median, MeijerG,
 MemberQ, MemoryConstrained, MemoryInUse, MenuPacket, Mesh, MeshRange, MeshStyle,
 Message, MessageList, MessageName, MessageOptions, MessagePacket, Messages,
 MessagesNotebook, MetaCharacters, Method, MethodOptions, Min, Minimize,
 Minors, MinRecursion, MinSize, Minus, Mod, Mode, Modular, ModularLambda,
 Module, Modulus, MoebiusMu, MonomialOrder, MonteCarlo, Most, MousePointerNote,
 MultiDimensional, MultilaunchWarning, MultilineFunction, Multinomial,
 MultiplicativeOrder, Multiplicity, N, n30, NameQ, Names, Nand, NBernoulliB,
 NDSolve, NeedCurrentFrontEndPackagePacket, NeedCurrentFrontEndSymbolsPacket,
 Needs, Negative, Nest, NestedScriptRules, NestList, NestWhile, NestWhileList,
 NevilleThetaC, NevilleThetaD, NevilleThetaN, NevilleThetaS, Newton,
 Next, NHoldAll, NHoldFirst, NHoldRest, NIntegrate, NMaximize, NMinimize,

NonAssociative, NonCommutativeMultiply, NonConstants, None, NonNegative, NonPositive, Nor, Norm, Normal, NormalGrouping, NormalSelection, NormFunction, Not, Notebook, NotebookApply, NotebookAutoSave, NotebookClose, NotebookConvert, NotebookConvertSettings, NotebookCreate, NotebookCreateReturnObject, NotebookDefault, NotebookDelete, NotebookDirectory, NotebookFind, NotebookFindReturnObject, NotebookGet, NotebookGetLayoutInformationPacket, NotebookGetMisspellingsPacket, NotebookInformation, NotebookLocate, NotebookObject, NotebookOpen, NotebookOpenReturnObject, NotebookPath, NotebookPrint, NotebookPut, NotebookPutReturnObject, NotebookRead, NotebookResetGeneratedCells, Notebooks, NotebookSave, NotebookSaveAs, NotebookSelection, NotebookSetupLayoutInformationPacket, NotebooksMenu, NotebookWrite, NotElement, NProduct, NProductExtraFactors, NProductFactors, NRoots, NSolve, NSum, NSumExtraTerms, NSumTerms, Null, NullRecords, NullSpace, NullWords, Number, NumberForm, NumberFormat, NumberMarks, NumberMultiplier, NumberPadding, NumberPoint, NumberQ, NumberSeparator, NumberSigns, NumberString, Numerator, NumericFunction, NumericQ, NValues, O, OddQ, Off, Offset, OLEData, On, OneIdentity, OneStepRowReduction, Open, OpenAppend, OpenFunctionInspectorPacket, OpenRead, OpenSpecialOptions, OpenTemporary, OpenWrite, Operate, OptimizationLevel, Optional, OptionInspectorSettings, OptionQ, Options, OptionsPacket, OptionValueBox, OptionValueBoxOptions, Or, Orange, Order, OrderedQ, Ordering, Orderless, Oscillatory, Out, Outer, OutputAutoOverwrite, OutputForm, OutputFormData, OutputGrouping, OutputMathEditExpression, OutputNamePacket, OutputStream, OutputToOutputForm, OutputToStandardForm, Over, Overflow, Overlaps, Overscript, OverscriptBox, OverscriptBoxOptions, OwnValues, PaddedForm, PadLeft, PadRight, PageBreakAbove, PageBreakBelow, PageBreakWithin, PageFooterLines, PageFooters, PageHeaderLines, PageHeaders, PageHeight, PageWidth, PalettePath, PaperWidth, ParagraphIndent, ParagraphSpacing, ParameterVariables, ParametricPlot, ParametricPlot3D, ParentConnect, ParentDirectory, ParentForm, Parenthesize, Part, Partition, PartitionsP, PartitionsQ, PasteBoxFormInlineCells, Path, Pattern, PatternTest, Pause, PeriodicInterpolation, Permutations, Pi, Pick, Piecewise, PiecewiseExpand, Pink, Pivoting, PixelConstrained, Placeholder, Plain, Play, PlayRange, Plot, Plot3D, Plot3Matrix, PlotDivision, PlotJoined, PlotLabel, PlotPoints, PlotRange, PlotRegion, PlotStyle, Plus, Pochhammer, Point, PointForm, PointSize, PolyGamma, Polygon, PolygonIntersections, PolyLog, PolynomialForm, PolynomialGCD, PolynomialLCM, PolynomialMod, PolynomialQ, PolynomialQuotient, PolynomialReduce, PolynomialRemainder, Polynomials, Position, Positive, Postfix, PostScript, Power, PowerExpand, PowerMod, PowerModList, Precedence, PrecedenceForm, Precision, PrecisionGoal, PreDecrement, PreferencesPath, Prefix, PreIncrement, Prepend, PrependTo, PreserveStyleSheet, Previous, PrimaryPlaceholder, Prime, PrimePi, PrimeQ, Primes, PrincipalValue, Print, PrintAction, PrintForm, PrintingCopies, PrintingOptions, PrintingPageRange, PrintingStartingPageNumber, PrintingStyleEnvironment, PrintPrecision, PrivateCelloptions, PrivateEvaluationOptions, PrivateFontOptions, PrivateNotebookOptions, PrivatePaths, Product, ProductLog, Prolog, PromptForm, Protect, Protected, PseudoInverse, Purple, Put, PutAppend, QRDecomposition, Quantile, Quartics, QuasiMonteCarlo, QuasiNewton, Quit, Quotient, RadicalBox, RadicalBoxOptions, Random, RandomSeed, Range, Raster, RasterArray, Rational, RationalFunctions, Rationalize, Rationals, Raw, RawData, RawMedium, Re, Read, ReadList, ReadProtected, Real, RealBlockForm, RealDigits, Reals, Reap, Recall, Record, RecordLists, RecordSeparators, Rectangle, Red, Reduce, Refine, Refresh, RegularExpression, Reinstall, Release, ReleaseHold, Remove, Removed, RenameDirectory, RenameFile, RenderAll, RenderingOptions, Repeated, RepeatedNull, RepeatedString, Replace, ReplaceAll, ReplaceHeldPart, ReplaceList, ReplacePart, ReplaceRepeated, Rescale, ResetDirectory, ResetMenusPacket, Residue, Resolve, Rest, Resultant, ResumePacket, Return, ReturnExpressionPacket, ReturnInputFormPacket, ReturnPacket, ReturnTextPacket, Reverse, RGBColor,

RiemannSiegelTheta, RiemannSiegelZ, Right, Root, RootReduce, Roots, RootSum, RotateLabel, RotateLeft, RotateRight, Round, Row, RowAlignments, RowBox, RowLines, RowMinHeight, RowReduce, RowsEqual, RowSpacings, RSolve, Rule, RuleCondition, RuleDelayed, RuleForm, RulerUnits, Run, RunThrough, SameQ, SameTest, SampleDepth, SampledSoundFunction, SampledSoundList, SampleRate, Save, Saveable, SaveAutoDelete, Scaled, Scan, SchurDecomposition, ScientificForm, ScreenRectangle, ScreenStyleEnvironment, ScriptBaselineShifts, ScriptLevel, ScriptMinSize, ScriptRules, ScriptSizeMultipliers, ScrollingOptions, ScrollPosition, Sec, Sech, Second, SectionGrouping, SeedRandom, Select, Selectable, SelectedNotebook, Selection, SelectionAnimate, SelectionCell, SelectionCellCreateCell, SelectionCellDefaultStyle, SelectionCellParentStyle, SelectionCreateCell, SelectionDuplicateCell, SelectionEvaluate, SelectionEvaluateCreateCell, SelectionMove, SelectionSetStyle, SelectionStrategy, SendFontInformationToKernel, Sequence, SequenceForm, SequenceHold, SequenceLimit, Series, SeriesCoefficient, SeriesData, SessionTime, Set, SetAccuracy, SetAttributes, SetBoxFormNamesPacket, SetDelayed, SetDirectory, SetEvaluationNotebook, SetFileDate, SetFileLoadingContext, SetNotebookStatusLine, SetOptions, SetOptionsPacket, SetPrecision, SetSelectedNotebook, SetSpeechParametersPacket, SetStreamPosition, SetValue, Shading, Shallow, Share, Short, ShortestMatch, Show, ShowAutoStyles, ShowCellBracket, ShowCellLabel, ShowCellTags, ShowClosedCellArea, ShowContents, ShowCursorTracker, ShowGroupOpenCloseIcon, ShowPageBreaks, ShowSelection, ShowShortBoxForm, ShowSpecialCharacters, ShowStringCharacters, ShrinkWrapBoundingBox, Sign, Signature, SignPadding, Simplify, Sin, SingleLetterItalics, SingularityDepth, SingularValueDecomposition, SingularValueList, SingularValues, Sinh, SinhIntegral, SinIntegral, SixJSymbol, Skeleton, Skip, Slot, SlotSequence, Smaller, Socket, Solve, SolveAlways, SolveDelayed, Sort, Sound, SoundAndGraphics, Sow, Space, SpaceForm, SpanAdjustments, SpanCharacterRounding, SpanLineThickness, SpanMaxSize, SpanMinSize, SpanningCharacters, SpanSymmetric, Sparse, SparseArray, SpeakTextPacket, SpellingCorrection, SpellingDictionaries, SpellingDictionariesPath, SpellingOptions, SpellingSuggestionsPacket, Spherical, SphericalHarmonicY, SphericalRegion, Splice, Split, Sqrt, SqrtBox, SqrtBoxOptions, Stack, StackBegin, StackComplete, StackInhibit, StandardDeviation, StandardForm, StartingStepSize, StartOfLine, StartOfString, StartupSound, StepMonitor, StieltjesGamma, StirlingS1, StirlingS2, StoppingTest, StreamPosition, Streams, String, StringBreak, StringByteCount, StringCases, StringCount, StringDrop, StringExpression, StringForm, StringFreeQ, StringInsert, StringJoin, StringLength, StringMatchQ, StringPosition, StringQ, StringReplace, StringReplaceList, StringReplacePart, StringReverse, StringSkeleton, StringSplit, StringTake, StringToStream, StripBoxes, StripWrapperBoxes, StructuredSelection, StruveH, StruveL, Stub, StyleBox, StyleBoxAutoDelete, StyleBoxOptions, StyleData, StyleDefinitions, StyleForm, StyleMenuListing, StyleNameDialogSettings, StylePrint, StyleSheetPath, Subresultants, Subscript, SubscriptBox, SubscriptBoxOptions, Subscripted, Subsets, Subsuperscript, SubsuperscriptBox, SubsuperscriptBoxOptions, Subtract, SubtractFrom, SubValues, SugarCube, Sum, Superscript, SuperscriptBox, SuperscriptBoxOptions, SurfaceColor, SurfaceGraphics, SuspendPacket, Switch, SylvesterMatrix, Symbol, SymbolName, Syntax, SyntaxForm, SyntaxLength, SyntaxPacket, SyntaxQ, SystemException, SystemHelpPath, SystemStub, Tab, TabFilling, Table, TableAlignments, TableDepth, TableDirections, TableForm, TableHeadings, TableSpacing, TabSpacings, TagBox, TagBoxOptions, TaggingRules, TagSet, TagSetDelayed, TagStyle, TagUnset, Take, Tan, Tanh, TargetFunctions, Temporary, TemporaryVariable, TensorQ, TensorRank, TexForm, TexSave, Text, TextAlignment, TextBoundingBox, TextData, TextForm, TextJustification, TextLine, TextPacket, TextParagraph, TextRendering, TextStyle, Thickness, ThisLink, Thread, ThreeJSymbol, Through, Throw, Ticks, TimeConstrained, TimeConstraint, Times, TimesBy, TimeUsed, TimeVariable, TimeZone, Timing,

TitleGrouping, ToBoxes, ToCharCode, ToColor, ToDate, ToExpression, ToFileName, Together, Toggle, ToggleFalse, ToHeldExpression, TokenWords, Tolerance, ToLowerCase, TooBig, Top, ToRadicals, ToRules, ToString, Total, TotalHeight, TotalWidth, ToUpperCase, Tr, Trace, TraceAbove, TraceAction, TraceBackward, TraceDepth, TraceDialog, TraceForward, TraceInternal, TraceLevel, TraceOff, TraceOn, TraceOriginal, TracePrint, TraceScan, TraditionalForm, TraditionalFunctionNotation, TraditionalNotation, TraditionalOrder, TransformationFunctions, TransparentColor, Transpose, Trapezoidal, TreeForm, Trig, TrigExpand, TrigFactor, TrigFactorList, TrigReduce, TrigToExp, True, TrueQ, Tuples, UnAlias, Underflow, Underoverscript, UnderoverscriptBox, UnderoverscriptBoxOptions, Underscript, UnderscriptBox, UnderscriptBoxOptions, UndocumentedTestFEParsePacket, UndocumentedTestGetSelectionPacket, Unequal, Unevaluated, Uninstall, Union, Unique, UnitStep, Unprotect, UnsameQ, Unset, Up, Update, UpperCaseQ, UpSet, UpSetDelayed, UpValues, URL, Using, V2Get, Value, ValueBox, ValueBoxOptions, ValueForm, ValueQ, Variables, Variance, VectorQ, Verbatim, Verbose, VerboseConvertToPostScriptPacket, VerifyConvergence, VerifySolutions, Version, VersionNumber, Vertical, VerticalForm, ViewCenter, ViewPoint, ViewPointSelectorSettings, ViewVertical, Visible, VisibleCell, WeierstrassHalfPeriods, WeierstrassInvariants, WeierstrassP, WeierstrassPPrime, WeierstrassSigma, WeierstrassZeta, Which, While, White, Whitespace, WhitespaceCharacter, WindowClickSelect, WindowElements, WindowFloating, WindowFrame, WindowFrameElements, WindowMargins, WindowMovable, WindowSize, WindowTitle, WindowToolbars, WindowWidth, With, Word, WordBoundary, WordCharacter, WordSearch, WordSeparators, WorkingPrecision, Write, WriteString, WynnDegree, x, XMLElement, XMLObject, Xor, y, Yellow, ZeroTest, ZeroWidthTimes, Zeta, ZTransform, \$, \$Aborted, \$AddOnsDirectory, \$AnimationDisplayFunction, \$AnimationFunction, \$Assumptions, \$BaseDirectory, \$BatchInput, \$BatchOutput, \$BoxForms, \$ByteOrdering, \$CharacterEncoding, \$CommandLine, \$ConditionHold, \$Context, \$ContextPath, \$CreationDate, \$CurrentLink, \$DefaultFont, \$DefaultPath, \$Display, \$DisplayFunction, \$DumpDates, \$DumpSupported, \$Echo, \$Epilog, \$ExportEncodings, \$ExportFormats, \$Failed, \$FormatType, \$FrontEnd, \$HistoryLength, \$HomeDirectory, \$IgnoreEOF, \$ImportEncodings, \$ImportFormats, \$InitialDirectory, \$Input, \$Inspector, \$InstallationDate, \$InstallationDirectory, \$InterfaceEnvironment, \$IterationLimit, \$Language, \$LaunchDirectory, \$LicenseExpirationDate, \$LicenseID, \$LicenseProcesses, \$LicenseServer, \$Line, \$Linked, \$LinkSupported, \$MachineDomain, \$MachineEpsilon, \$MachineID, \$MachineName, \$MachinePrecision, \$MachineType, \$MaxExtraPrecision, \$MaxLicenseProcesses, \$MaxMachineNumber, \$MaxNumber, \$MaxPiecewiseCases, \$MaxPrecision, \$MaxRootDegree, \$MessageList, \$MessagePrePrint, \$Messages, \$MinMachineNumber, \$MinNumber, \$MinPrecision, \$ModuleNumber, \$NetworkLicense, \$NewMessage, \$NewSymbol, \$Notebooks, \$NumberMarks, \$Off, \$OperatingSystem, \$Output, \$OutputForms, \$Packages, \$ParentLink, \$ParentProcessID, \$PasswordFile, \$Path, \$PathnameSeparator, \$PipeSupported, \$Post, \$Pre, \$PreferencesDirectory, \$PrePrint, \$PreRead, \$PrintForms, \$PrintLiteral, \$ProcessID, \$ProcessorType, \$ProductInformation, \$ProgramName, \$PSDirectDisplay, \$RandomState, \$RasterFunction, \$RecursionLimit, \$ReleaseNumber, \$RootDirectory, \$SessionID, \$SetParentLink, \$SoundDisplay, \$SoundDisplayFunction, \$SuppressInputFormHeads, \$SyntaxHandler, \$System, \$SystemCharacterEncoding, \$SystemID, \$TemporaryPrefix, \$TextStyle, \$TimeUnit, \$TopDirectory, \$TraceOff, \$TraceOn, \$TracePattern, \$TracePostAction, \$TracePreAction, \$Urgent, \$UserAddOnsDirectory, \$UserBaseDirectory, \$UserName, \$Version, \$VersionNumber}

5.7. Verschiedene Möglichkeiten, eine Funktion zu codieren:

■ Différentes manières de coder une fonction:

5.7.1. Die Definition einer Funktion:

■ La définition d'une fonction:

Beispiel: Die Funktion " $f(x) = \sin(x) * \cos(2x)$ " soll definiert werden.

Der Unterstrich "_" gibt die Funktionsvariable an. "[:=" bedeutet "definiere":

■ Exemple: Il faut définir la fonction " $f(x) = \sin(x) * \cos(2x)$ ". Le trait "_" indique la variable de la fonction. "[:=" signifie "définis":

```
In[50]:= f[x_]:= Sin[x] Cos[2 x]
```

Ausgabe zur Kontrolle:

■ Sortie de contrôle:

```
In[51]:= f[x]
```

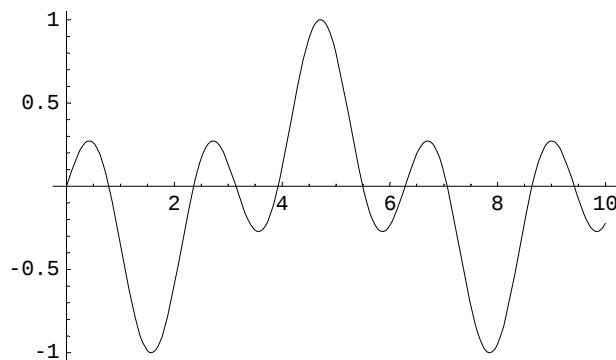
```
Out[51]= Cos[2 x] Sin[x]
```

Anwendung: ■ Application:

```
In[52]:= f[Pi]
```

```
Out[52]= 0
```

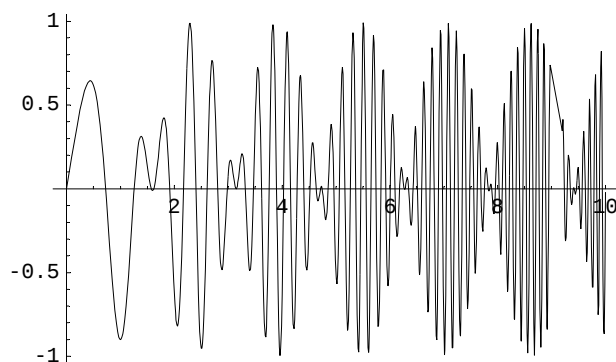
```
In[53]:= Plot[f[x],{x, 0, 10}];
```



Kurz in einer Zelle eine andere Funktion:

■ Brièvement une autre fonction dans une cellule:

```
In[54]:= f1[x_]:= Sin[2x] Cos[3 x^2];
          Plot[f1[x],{x, 0, 10}];
```



Zum Vergleich, wie es **nicht** funktioniert:

■ En tant que comparaison: Voici comme ça **ne** fonctionne **pas**:

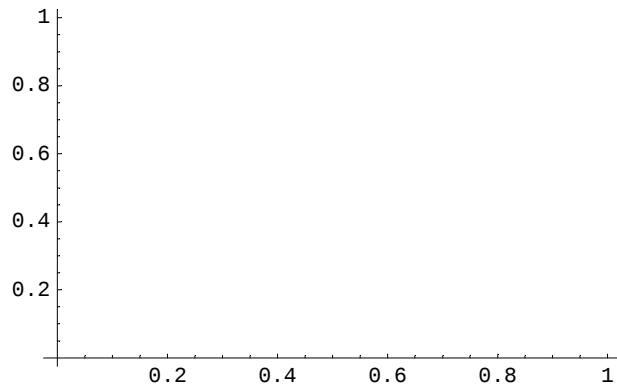
```
In[56]:= g[x]:= Sin[2x] Cos[3 x^2];
          Plot[g[x],{x, 0, 10}];
```

Plot::plnr : g[x] is not a machine-size real number at x = 4.166666666666667`⁻⁷. Mehr...

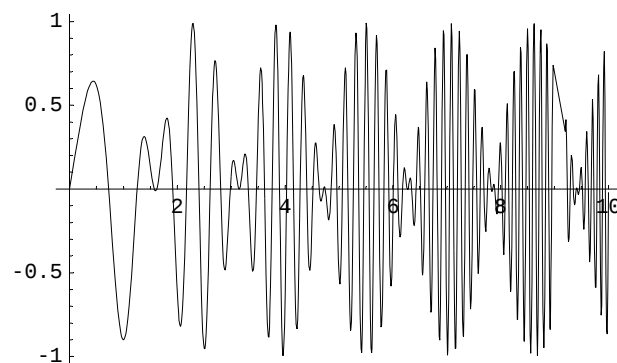
Plot::plnr : g[x] is not a machine-size real number at x = 0.40566991572915795`. Mehr...

Plot::plnr : g[x] is not a machine-size real number at x = 0.848087998593737`. Mehr...

General::stop : Further output of Plot::plnr will be suppressed during this calculation. Mehr...



```
In[58]:= g1[x_]= Sin[2x] Cos[3 x^2];
          Plot[g1[x],{x, 0, 10}];
```



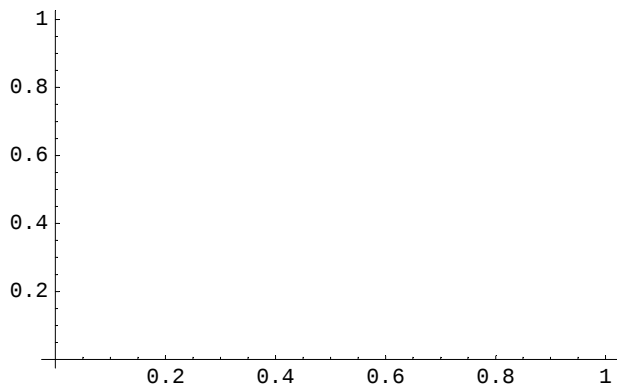
```
In[60]:= g2[x]= Sin[2x] Cos[3 x^2];
          Plot[g2[x],{x, 0, 10}];
```

Plot::plnr : g2[x] is not a machine-size real number at x = 4.166666666666667`*^-7. Mehr...

Plot::plnr : g2[x] is not a machine-size real number at x = 0.40566991572915795`. Mehr...

Plot::plnr : g2[x] is not a machine-size real number at x = 0.848087998593737`. Mehr...

General::stop : Further output of Plot::plnr will be suppressed during this calculation. Mehr...



5.7.2. Die Prefix-Notation:

■ La notation préfixe:

Beispiel: Die Funktion "N" mit Klammern "[...]":

■ Exemple: La fonction "N" avec des parenthèses "[...]":

```
In[62]:= N[Sqrt[2]/2]
```

```
Out[62]= 0.707107
```

5.7.3. Die Postfix-Notation:

■ La notation postfixe:

Beispiel: "N" kommt hinten, abgetrennt durch "//":

■ Exemple: "N" se place derrière, séparé par "//":

```
In[63]:= Sqrt[2]/2 // N
```

```
Out[63]= 0.707107
```

Damit lassen sich "Pipes" bilden. d.h. mehrere Funktionen nacheinander ausführen. Beispiele:

■ Ainsi on peut former des "pipes", c'est-à-dire générer plusieurs fonctions l'une après l'autre. Exemples:

```
In[64]:= "W*" // Names
```

```
Out[64]= {WeierstrassHalfPeriods, WeierstrassInvariants, WeierstrassP, WeierstrassPPrime,
          WeierstrassSigma, WeierstrassZeta, Which, While, White, Whitespace,
          WhitespaceCharacter, WindowClickSelect, WindowElements, WindowFloating,
          WindowFrame, WindowFrameElements, WindowMargins, WindowMovable, WindowSize,
          WindowTitle, WindowToolbars, WindowWidth, With, Word, WordBoundary, WordCharacter,
          WordSearch, WordSeparators, WorkingPrecision, Write, WriteString, WynnDegree}
```

```

In[65]:= "W*" // Names // Length
Out[65]= 32

In[66]:= x = Pi/2
Out[66]=  $\frac{\pi}{2}$ 

In[67]:= Sin[x]
Out[67]= 1

In[68]:= Sin[x] // Sin // N
Out[68]= 0.841471

In[69]:= Sin[x] // Sin // Sin // N
Out[69]= 0.745624

In[70]:= Sin[x] // Sin // Sin // Sin // Sin // N
Out[70]= 0.627572

In[71]:= N[Sin[Sin[Sin[Sin[Sin[x]]]]]]
Out[71]= 0.627572

```

5.8. Output unterdrücken

■ Supprimer l'output

5.8.1. Mit ";" am Schluss

■ Mettre ";" à la fin

Beispiel: ■ Exemple:

```

In[72]:= Sin[4.08]
Out[72]= -0.806618

In[73]:= Sin[3.96];

```

Abrufen: ■ Appeler:

```

In[74]:= %
Out[74]= -0.730058

```

5.8.2. Diverse Befehle in einer Zelle. Welcher Output kommt?

■ Différents ordres dans une cellule. Quel sera l'output?

Beispiele: ■ Exemples:

```
In[75]:= a=1; b=2; c=3; d=4
```

```
Out[75]= 4
```

```
In[76]:= a=1; b=2; c=3; d=4;
```

```
In[77]:= a=1; b=2; Print[b]; c=3; d=4;
```

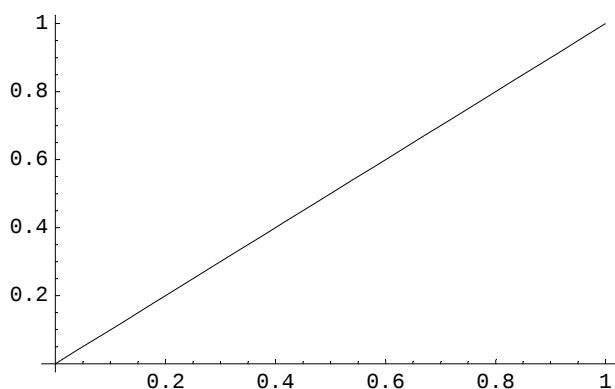
```
2
```

```
In[78]:= a=1; b=2; Print[b]; c=3; d=4
```

```
2
```

```
Out[78]= 4
```

```
In[79]:= a=1; b=2; Plot[x,{x,0,1}]; c=3; d=4
```



```
Out[79]= 4
```

5.9. Timing - Rechenzeit messen

■ Timing - mesurer le temps de calcul

Mit "Timing" wird die CPU-Zeit gemessen. Beispiele:

■ Avec "Timing" on mesure le temps CPU. Exemple:

```
In[80]:= Timing[N[Pi,500]]
```

```
Out[80]= {0. Second,
3.141592653589793238462643383279502884197169399375105820974944592307816406286208...
9986280348253421170679821480865132823066470938446095505822317253594081284811174...
5028410270193852110555964462294895493038196442881097566593344612847564823378678...
3165271201909145648566923460348610454326648213393607260249141273724587006606315...
5881748815209209628292540917153643678925903600113305305488204665213841469519415...
1160943305727036575959195309218611738193261179310511854807446237996274956735188...
57527248912279381830119491}
```

Ohne den Output der Rechnung:

■ Sans l'output du calcul:

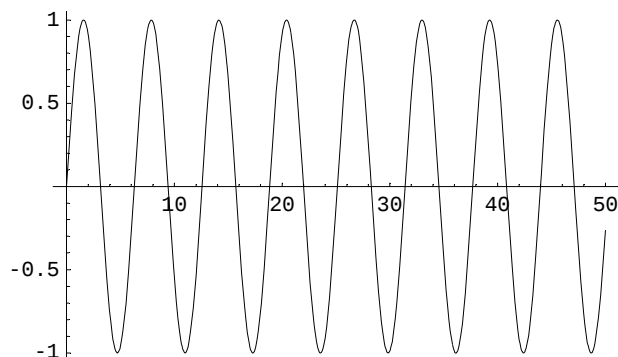
```
In[81]:= Timing[N[Pi,500];]
```

```
Out[81]= {0. Second, Null}
```

```
In[82]:= Timing[N[Pi,2000];]
```

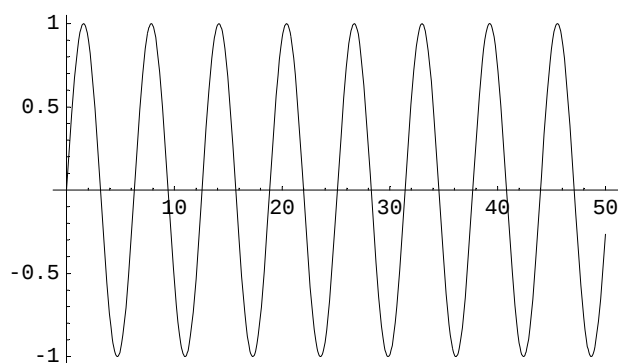
```
out[82]= {0. Second, Null}
```

```
In[83]:= Plot[Sin[x],{x, 0, 50}] // Timing
```



```
out[83]= {0. Second, - Graphics -}
```

```
In[84]:= Plot[Sin[x],{x, 0, 50}]; // Timing
```



```
out[84]= {0. Second, Null}
```

5.10 Abbruch und Unterbruch

■ Rupture et interruption

Während der Rechnungsausführung hast Du im Menu unter ("Action") neu "Kernel" - "Interrupt" die Möglichkeit, mit "Abort" abzubrechen oder mit "Interrupt Calculation" zu unterbrechen.

Der Abbruch ist auf NeXT auch möglich über die Tastatur mit "Command" und "." zusammen gedrückt. U.s.w..

Probiere aus (z.B. 5000 Fakultät....):

■ Dans le menu sous ("Action") nouveau "Kernel" - "Interrupt" tu as la possibilité d'interrompre le calcul par "Interrupt Calculation" ou définitivement par "Abort".

Sur NeXT l'interruption définitive est aussi possible avec les touches "Command" et ".", pressées simultanément. Etc..

Essaie (p.ex. 5000 factoriel)

```
In[85]:= 5000!
```

```
out[85]= 422857792660554352220106420023358440539078667462664674884978240218135805270810820\
06908990478717063875370847466573006854458784860666838127363372108937727876312793\
90363058462160643904478986982239871929708896211612652968321775500399242196837031\
46907264472878789790404754884162215226671928410969236910449565971736352948400223\
```

84038112064482023085767110450230617489475542830976178172404080532480992780932878
40554861993645482912118762582488021891739779000502132125980436392446264607705113
58846595108675470585833924655225589035474435988347383178988034633008458631510209
09150993565382001093304796574255674193091705517280520023607508599119763522875590
79020433697431235069168312119244959715562674075214621989862330886259983028598648
57578749445963115286970886710046268423648178989905454690861391613218344174148807
18623444811483120949036119654687276775561788682872026910481409245641034183597560
42764581615131785759016610717825441569808833593727299956033713712004710494376562
91142488605335299499642300699972204918120100819059439140675053265004775533850899
09794510155109148690700440711957233602624336813233021870928769919680665656975279
04222582678415610833764257810326292026872110702746813943511286015023261906499591
71897364176378436491219709109840944514895358959103804176941956657834822071749105
51275263914838117205260482696516264271009491939333266103010436053045911701455720
95847143537219482466867934673759048722681334102078609036571088063766162497495074
13107077401682180585945526445171409277469230062697511346044174567946735828782261
62958424867515737917294272417878310542985824511757551188450657442482757466080023
85883784923962473687615070157677258983211286322955370449025163879251275908417917
44640466913531047347984464996154595542013996317357476301740036796192919942190762
89544565626176704179953816113338731282351153415258130908791588363835166479722591
29442706535571425117373238072326329581217979166796923296870969239010032555747890
55099807487061047230646195984955239657612208673866514171699307557691897902675157
34207586479634533844683508596549072732632191050406428971309622450516206466946809
88699171221274045040206849232662417601329102278666872703052847094525268254966177
72499645206699836925910690894082637401043498371591126455822280606361394115344316
77176993435366428492829443641476961588199366138825557748770993700459475390784514
90344345211745605940399162684446976618213874707053255595779331964609966621453775
64935474169708562389214773222865507182490430016186142192760452307670621142961767
27470412361610722000974375864749275366514953216478084907514633007101669131342066
28825626182838658369836321087607104275160733483477884147967324270804108607618412
81888307115098982135338406610652147087046874760995427473673509451553599769040367
35338555105257168265031768240574399341486239233198143257918219332189894045086501
36109980983839931109963559813280010497315885963121318538012050467876429106693656
00437305633431984879048998524701293300789344532868156679762880495532846386020133
48026527983694639338499567504999370781474656154343893043138423787898184780288600
99710886956329883477118631223827859636531151323779313736473974293694114990287519
72227999545182615488298951151926682112451355318472209990435355949887299922035062
03981601108637623653978217238023784665067362451063503442318731533830821204380471
09994192278210397475527174160438901697239613055493718448361198035658960620250090
93664399360172007383613354405094329072476518909502507724675841989412224659392163
11635203814736247952853973208930953342191063570280557662972015655651076778080593
34536311218295617928876730028024509321227788529684182082617784769556449803856912
75787372678040959158711733971103165232678060798127609246173504120182666874262805
38527584397916760900774338074842075118511910292196033937628098675366508521286925
53215367879325218825741018661370543289737358627253701785588066398513503869440396
04928258820180419178073649693885802597758398892014389747165465973510852605706234
40206963706566012953573404358296147342727580563083951066737534925965951857564693
97232182757800032505938953038205396975588705115430739208274224405162997087395997
68461206246629098112368012579891284802505094028916959765079395437191311379314427
40513559963037564221452729434179724618759796407423914783899354156583471615685849
90367730566113538333670875489004130919816763307490415103375973072468858392469417
15548295730750618505881581959528992660225626903439573313450666972952115230668696
22792094777997433657447267347140892807141128388808269337737807729310411076751363
94762006108580405960196390580157610023374638693522283858014349571781255814458629
3004279404065736859862007914604590255413929950088044710384758990326548097338166
94050008545272371357139490246382030866854180283831752766806427848956100575585999
17189667864491540635700144971942498789208597312542755675145752063991181507363974
83102490793841725653421894276769116598153430084637087769510295415136551734675054
01523970604257174600108996844049884598547797790503163256848915655723100649972649

87214808001817703577015029830088794872438877188844168330347087232395053776422329
44095773219137582371673924704216723002256883135779230394688900662466182532658490
72440676702493957969721746748556299818314966561174399768048209416625746387966030
51712749251192263676153375243816562173307716501295209887548564671318626023876199
64334867961514408328902061082833180891221325853682856469916007952105166960451695
43061421230574300687721740715547321795757701759596764056381272915386751369871239
55705423509992286059754699621861955313541321391264366769004654299968116805507378
66770665988027062972502001882845886145344368771455361304414465613369092862748276
98194683648055095296868175871485997297308233292409477708527527992330489271963331
47515633111927461503892192906167806079013834511370663006843762671998855151436812
66137319912103235469786756421210624899005553564022924345831264231038363416781719
90835414041171774018595060667419834814334544424719143682822565438004786039057592
24170718026706468754542116269587467953985407844646541403817511499652736211235408
80166990280149033225139460832668170930713868826549977374286127789417784752681328
37181875910364214088178322073980805971420328530972144304184545918300283340870578
31382849732837612861829271367451618973662072373961327909449840141544083040744053
93067540767126182547597130843470311389815695365971788564022750674237400323621850
09476526752194190124138747827988342647087361681248538444401277252105007227931585
30962791211311601677720779525726138002406844218854535371213419022363796840123852
55288607189967725694227433323948595075570839061877450159652184414998155476107548
00805419231843694819173263143060354839979078330726763672909098077282735585434803
22600674725370977854645677611818073674243673917698637580721458597914850337005929
94963793369100283444558089838054017635403737133019311293080958287612107380374800
66026976784288835826573748655678586882201514304624965599576037976868531819236580
64691995840718454936069221697761375426622396586449897709214781347091279174608716
30220821981434654245065731262683089579031012893360788644107230184805400373136014
21622915914699201988414829001441431280090310210783330509023843572677941617724687
34115035987000031510928157003310817274156246804329772050704504566838986263017029
89301145364477416856732512330376477881749036052572605520684370616116539755132541
36930386778326720822732366424920643236308926876882665093969186168327173975747955
29932424061869924203637819294853680980352563310924482152692762191162591458863936
77034653480367887126133367116968226450914997055448521259751870084720025674658752
40393206104590307003943825201938310248092901968460247217129832162823799462712536
63599718983744250991206736883837382996538920306628430745475590742353452740292116
06091346327684749522046010409575607348155101677203187580089224494752922031093841
66158882358499393174514991439555735764158418547983170242852396545108752542546477
72945952303609464165419977979471368063449159987724091764431373711785422107405721
21166868692153240490080384205921192622875440898261478908123698956367080804687628
52449989744085567796945690904234053035594352464075167787395311392869861434722757
21449468918960932943754767412349077927543383494123230600787676100899491561269340
38921148370217193387617823370358925817112869563450001367619897145400986643461922
19767697593001055522519891300212302178083193433088044659295455216591185593920257
97811229520653573629144784049464745650031154980720565803606673808895727464643754
28055819322299305089287806874537401327100274428317925355003451536693172112088227
60394280978864572730697997128564957693435400403072844058174664837665849803995896
42433701834541517202853378109041131244624329033539642966511094828368845801275887
01293156099225044518125460113274986014470437757313881001319276124676116614833528
93555750310601844978899437827461385465170824161316768146391187000081284514434140
67399854300727723037581116135110943556148963239297508463831529302635825353617848
37558519666949972251935515953807207838615142130284450051795239760968433198292598
92162322358239639026254885685587545819837155900844786008674594570911812879322822
2051767509371866110013193625845223493949829511192808378605235064127693375481306
09594264463425077601147334209139128541628183172262143783062962408149391997187528
10636734887667848160234274323002715819240418768654582651936199068733689288671513
38402454861109824820044827217994966587122571744290449167811948241656315603034738
33317665121218052780795958220298330611945164019413315550379662980215357680731124
53058591596970997398805574355008327907184495975235359464435478968037212634450942
30702539951028644582374546777610135569162123097522861520532139987456730341276765

03369636682306665552051562491132528926155863868503100849180920507680658265915276
16371992869425835060485973227394928608026064062752134100780181510562378792621203
94247818334394338772063958011158090841907943201951782357401905465959902896177117
76195270354051193727229722248442080440098750369411277686593022133010625031862085
14507642105298050883719798605255775030394960615844283884686613751096844156730983
80793943495700130292651779571206255558519513135740298975892834755253344098589114
00694449308432874005015554332587793895080241128538758725945136400838324944471346
43682614819540600411484587023407292669774063132587863479066769826618150125611769
22757152912491648217023728844163576009968511009394114446776281860070722785223149
41048564396255796808221289935799262208553889221164765220850367706476491496133789
35376153739156917782223774483761412025334262250800730051347342277142733310634597
18032402442269504580905393266891036193819988388440362317952824354953624896707341
55948067688515321073064476077859628627852283657244564306449096277517172656954238
39294195840952725328165957253453142838962989400588653948682411711392962735693897
34829358546502786894370147983838260020582088535170732162887252145222052659696149
62147884840129004507737252424605074339660818182960296019196314124998538422017695
11036138056170101635774354253114866936999413094090836822007193643511197859278249
34914770521872265461091995972694391524004679011736025210300518860803370848401148
10246351288263986170081804888380750203521448348740849154718714478857809574515499
5050050707894288428884100278777745598113231994062417653214868631658173677441008
40634369599895192883108691245178663425593534582425894113905164694403775626658215
77845936829909679754548350510473633770839151033854639602753486401635204633884342
34671493564142916085684672487424478205511375916823647229779361297108030253093447
81155277375404589689903548080583093812673235935630985465643762093853710528083446
07189076003388781618019853273759498566916704703448438363503416368325266403224174
51947667814042831932748285188214034431938444547545676525341965919433213258543227
00707590385652396682271713000091891220508451852615146279377175975288529786379317
11212529529443323757910072909001703558763798612480281463093944391916950129336315
04528516353931286858642743729610944610123560487743986329961189975596599660874904
92711676852686753359912975832090895532964095236401160600784950053778927837501473
44122123777907727134146647404489837589487675423294546899354220341669961366698976
5299785807958990558640503885070831373307683976688246368099235521972724183173512
76461891123804858831155694778881017597089776821496443403179244430851703036922141
37621194388641989508360339306459037361842937028710758321966607546113761076362543
92861431624289075402108223362001230938473731222037426903383857992867857293943416
82870537633740919381846322611317409342781179188916424475135434784460405494553798
34556163353815868441692054518698919434175386663900335756765603264363767906721626
62033087842554515720811724638125151266984668588720901314486163256046101951337181
45852499881766299251421450147102061931903736713803476634310297052224147850301882
75106347446241258707937339085095757724316735066885094208761536164440443755860160
62583709130057416206527367094188866796457055074472471413700196816521595438069851
59994833613575213221061318847719266419423953514122335467464614917430134758660373
38176532604557402925472279360288926189385899695656876783017186873988763887625972
74397606281326344664767941367972618493339507466582044167798980660420393711666633
66962825693490973483911558690048560325122192415342685223693160367654910477027335
21540143168338872968405443296967684036073182435336224865433823598123544167514608
34078116666185878173398062419925457785346267803903993755780275994295720528104377
56669793968381093411189594757662201912175350936389854652830786923706625123236843
90235587636228324657161183714078807661162179517887972801841572019639084400269037
45038119279717031448987181503131999211156390830301728801261064206200535924027827
73939180263917177201361259847769339806470637630226088853599375950790887890817918
02195768033381968605120487107610874898411568740159953020639098138993261095538868
26408401216083104052597453925157640373288908673694836640473462270856004089161078
22219434051797945501553476829668553200975019055814199145911241815010622556274112
31571377358697194374130822027383843815940638571387913337592362330440453487233047
24066878413333304789899525522146884797381356808399564453300522255132015526776889
54127703292786708274900411720766631127836381523435476816631211890868649913802362
81775275946061211813342054791801619220346912760381900528012343973598270461499814


```
In[86]:= 1000! // Timing
```

```
Out[86]= {0. Second,
40238726007709377354370243392300398571937486421071463254379991042993851239862902
0592044208486969404800479988610197196058631666872994808558901323829669944590997
4245040870737599188236277271887325197795059509952761208749754624970436014182780
9464649629105639388743788648733711918104582578364784997701247663288983595573543
2513185323958463075557409114262417474349347553428646576611667797396668820291207
3791438537195882498081268678383745597317461360853795345242215865932019280908782
9730843139284440328123155861103697680135730421616874760967587134831202547858932
0767169132448426236131412508780208000261683151027341827977704784635868170164365
0241536913982812648102130927612448963599287051149649754199093422215668325720808
2133318611681155361583654698404670897560290095053761647584772842188967964624494
5160765353408198901385442487984959953319101723355556602139450399736280750137837
6153071277619268490343526252000158885351473316117021039681759215109077880193931
7811419454525722386554146106289218796022383897147608850627686296714667469756291
1234082439208160153780889893964518263243671616762179168909779911903754031274622
2899880051954444142820121873617459926429565817466283029555702990243241531816172
1046583203678690611726015878352075151628422554026517048330422614397428693306169
0897968482590125458327168226458066526769958652682272807075781391858178889652208
1643483448259932660433676601769996128318607883861502794659551311565520360939881
8061213855860030143569452722420634463179746059468257310379008402443243846565724
5014402821885252470935190620929023136493273497565513958720559654228749774011413
3469627154228458623773875382304838656889764619273838149001407673104466402598994
9022222176590433990188601856652648506179970235619389701786004081188972991831102
1171229845901641921068884387121855646124960798722908519296819372388642614839657
3822911231250241866493531439701374285319266498753372189406942814341185201580141
2334482801505139969429015348307764456909907315243327828826986460278986432113908
3506217095002597389863554277196742822248757586765752344220207573630569498825087
9689281627538488633969099598262809561214509948717012445164612603790293091208890
8694202851064018215439945715680594187274899809425474217358240106367740459574178
5160829230135358081840096996372524230560855903700624271243416909004153690105933
983835777939410970027753472000000000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000000000000000000000000000000000}
```

5.11 Globale Variablen

■ Variables globales

Variablen, die mit "\$" beginnen

■ Variables qui commencent par "\$"

Mathematica stellt einige Variablen zur Verfügung. Diese beginnen mit dem Zeichen "\$". Hier sind sie:

■ *Mathematica* met quelques variables à disposition. Elles commencent par le signe "\$". Les voici:

```
In[87]:= ??*$
```

System`

\$	\$MessageList
\$Aborted	\$MessagePrePrint
\$AddOnsDirectory	\$Messages

\$AnimationDisplayFunction	\$MinMachineNumber
\$AnimationFunction	\$MinNumber
\$Assumptions	\$MinPrecision
\$BaseDirectory	\$ModuleNumber
\$BatchInput	\$NetworkLicense
\$BatchOutput	\$NewMessage
\$BoxForms	\$NewSymbol
\$ByteOrdering	\$Notebooks
\$CharacterEncoding	\$NumberMarks
\$CommandLine	\$Off
\$ConditionHold	\$OperatingSystem
\$Context	\$Output
\$ContextPath	\$OutputForms
\$CreationDate	\$Packages
\$CurrentLink	\$ParentLink
\$DefaultFont	\$ParentProcessID
\$DefaultPath	\$PasswordFile
\$Display	\$Path
\$DisplayFunction	\$PathnameSeparator
\$DumpDates	\$PipeSupported
\$DumpSupported	\$Post
\$Echo	\$Pre
\$Epilog	\$PreferencesDirectory
\$ExportEncodings	\$PrePrint
\$ExportFormats	\$PreRead
\$Failed	\$PrintForms
\$FormatType	\$PrintLiteral
\$FrontEnd	\$ProcessID
\$HistoryLength	\$ProcessorType
\$HomeDirectory	\$ProductInformation
\$IgnoreEOF	\$ProgramName
\$ImportEncodings	\$PSDirectDisplay
\$ImportFormats	\$RandomState
\$InitialDirectory	\$RasterFunction
\$Input	\$RecursionLimit
\$Inspector	\$ReleaseNumber
\$InstallationDate	\$RootDirectory
\$InstallationDirectory	\$SessionID
\$InterfaceEnvironment	\$SetParentLink
\$IterationLimit	\$SoundDisplay
\$Language	\$SoundDisplayFunction
\$LaunchDirectory	\$SuppressInputFormHeads
\$LicenseExpirationDate	\$SyntaxHandler
\$LicenseID	\$System
\$LicenseProcesses	\$SystemCharacterEncoding
\$LicenseServer	\$SystemID
\$Line	\$TemporaryPrefix
\$Linked	\$TextStyle
\$LinkSupported	\$TimeUnit
\$MachineDomain	\$TopDirectory
\$MachineEpsilon	\$TraceOff
\$MachineID	\$TraceOn
\$MachineName	\$TracePattern
\$MachinePrecision	\$TracePostAction
\$MachineType	\$TracePreAction
\$MaxExtraPrecision	\$Urgent

\$MaxLicenseProcesses	\$UserAddOnsDirectory
\$MaxMachineNumber	\$UserBaseDirectory
\$MaxNumber	\$UserName
\$MaxPiecewiseCases	\$Version
\$MaxPrecision	\$VersionNumber
\$MaxRootDegree	

Einige Anwendungen:

■ Quelques applications:

```
In[88]:= ?? $Line
```

\$Line is a global variable that specifies the number of the current input line. Mehr...

```
$Line = 88
```

```
In[89]:= $Line
```

```
Out[89]= 89
```

```
In[90]:= $Version
```

```
Out[90]= 5.2 for Microsoft Windows (June 20, 2005)
```

```
In[91]:= $VersionNumber
```

```
Out[91]= 5.2
```

```
In[92]:= $Letters
```

```
Out[92]= $Letters
```

5.12 Spezielle Formen

■ Formes spéciales

Mathematica-Zeichen sind Abkürzungen für Funktionen:

■ Les signes de *Mathematica* sont des abréviations de fonctions:

```
In[93]:= ?? /
```

x/y or `Divide[x, y]` is equivalent to $x y^{-1}$. Mehr...

```
Attributes[Divide] = {Listable, NumericFunction, Protected}
```

```
In[94]:= Alias["/"]
```

```
Out[94]= Divide
```

```
In[95]:= 2/3 // N
```

```
Out[95]= 0.666667
```

```
In[96]:= Divide[2, 3] // N
```

```
Out[96]= 0.666667
```

```
In[97]:= Divide[2, 3]
```

```
Out[97]=  $\frac{2}{3}$ 
```

```
In[98]:= Apply[Divide, {2, 3}]
```

```
Out[98]=  $\frac{2}{3}$ 
```

```
In[99]:= ??Apply
```

```
Apply[f, expr] or f @@ expr replaces the head of expr by f. Apply[f, expr,  
  levelspec] replaces heads in parts of expr specified by levelspec. Mehr...
```

```
Attributes[Apply] = {Protected}
```

```
Options[Apply] = {Heads -> False}
```

"Putzmaschine" einsetzen

■ Employer la "machine de nettoyage"

```
In[100]:=  
(* Old Form: Remove["Global`*"] *)
```

```
In[101]:=  
Remove["Global`*"]
```