



# Mit StarOffice zum Schwarzen Loch

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# Einführung in StarOffice Math

## Komponenten von StarOffice 5.2

**StarOffice** Writer, Calc, Impress,  
Draw, Schedule, Base,  
Mail, Discussion, Basic,  
Chart, Image, **Math**



# Einführung in StarOffice Math

**Komponenten von StarOffice 6.0**

**StarOffice Writer, Calc, Impress,  
Draw, Basic, Math**



# Eingabefenster

In der mathematischen Welt werden häufig Formeln verwendet, die man mit Hilfe der Komponenten Math von StarOffice der Firma Sun auf einfache Art und Weise schreiben kann.

The screenshot illustrates the Math component interface. At the top, a text box contains the formula  $(a+b)^2 = a^2 + 2ab + b^2$ . Below it, a window titled "Kommandos" (Commands) displays the same formula in a text field. To the right, a window titled "Auswahl" (Selection) shows a list of mathematical symbols and operators for selection, including  $\frac{a}{b}$ ,  $a \leq b$ ,  $a \in A$ ,  $f(x)$ ,  $\sum a$ ,  $\vec{a}$ ,  $a^{\text{sup}}$ ,  $\binom{a}{b}$ ,  $+a$ ,  $-a$ ,  $\pm a$ ,  $\mp a$ ,  $-a$ ,  $a+b$ ,  $a-b$ ,  $a \times b$ ,  $a * b$ ,  $a \wedge b$ ,  $a-b$ ,  $\frac{a}{b}$ ,  $a = b$ ,  $a / b$ ,  $a \vee b$ , and  $a \circ b$ .



# Freier Fall in Luft

The slide displays the differential equation for free fall with air resistance and its solution. The equation is  $m\ddot{x} = mg - C\dot{x}^2$ . The solution for velocity is  $\dot{x}(t) = \sqrt{\frac{mg}{C}} \frac{e^{2\sqrt{\frac{C}{mg}}gt} - 1}{e^{2\sqrt{\frac{C}{mg}}gt} + 1} = \sqrt{\frac{mg}{C}} \tanh\left(\sqrt{\frac{C}{mg}}gt\right)$ . Below the equations is a screenshot of a text editor window titled 'Kommandos' showing the LaTeX commands used to generate the content.

$$m\ddot{x} = mg - C\dot{x}^2$$
$$\dot{x}(t) = \sqrt{\frac{mg}{C}} \frac{e^{2\sqrt{\frac{C}{mg}}gt} - 1}{e^{2\sqrt{\frac{C}{mg}}gt} + 1} = \sqrt{\frac{mg}{C}} \tanh\left(\sqrt{\frac{C}{mg}}gt\right)$$

Kommandos

```
m ddot x ~ = ~ m g - C {dot x}^2 newline newline
dot x(t) ~ = ~ sqrt{m g} over C ~
{func e^{2 ~ sqrt{C over {m g}} g t} ~ - ~ 1} over {func e^{2 ~ sqrt{C over {m g}} g t} ~ + ~ 1} ~
= ~ sqrt{m g} over C ~ func tanh(sqrt{C over {m g}} ~ g t)
```



# Göttinger FunkLAN

$$\begin{aligned}\nabla \cdot \vec{D} &= 4\pi\rho \\ \nabla \times \vec{H} &= \frac{4\pi}{c} \vec{J} + \frac{1}{c} \frac{\partial \vec{D}}{\partial t} \\ \nabla \cdot \vec{B} &= 0 \\ \nabla \times \vec{E} + \frac{1}{c} \frac{\partial \vec{B}}{\partial t} &= \vec{0} \\ \vec{F} &= q \left( \vec{E} + \frac{1}{c} \vec{v} \times \vec{B} \right)\end{aligned}$$

```
Kommandos
widevec nabla cdot widevec func D ~ = ~ 4 %pi %rho newline
widevec nabla times widevec func H ~ = ~ {{4 %pi}} over {} ~ vec func J ~ +
~ {1 over {} {partial widevec func D } over {partial t} newline
widevec nabla cdot widevec func B ~ = ~ 0 newline
widevec nabla times vec func E ~ + ~ {1 over {} {partial widevec func B} over {partial t} ~ = ~ widevec 0 newline
widevec func F ~ = ~ q (widevec func E ~ + ~ {1 over {} {widevec v times widevec func B})
```



# Differenziell

$$\frac{\partial D_1(\vec{x}, t)}{\partial x_1} + \frac{\partial D_2(\vec{x}, t)}{\partial x_2} + \frac{\partial D_3(\vec{x}, t)}{\partial x_3} = 4\pi\rho(\vec{x}, t)$$

$$\frac{\partial H_3(\vec{x}, t)}{\partial x_2} - \frac{\partial H_2(\vec{x}, t)}{\partial x_3} = \frac{4\pi}{c} J_1(\vec{x}, t) + \frac{1}{c} \frac{\partial D_1(\vec{x}, t)}{\partial t}$$

$$\frac{\partial H_1(\vec{x}, t)}{\partial x_3} - \frac{\partial H_3(\vec{x}, t)}{\partial x_1} = \frac{4\pi}{c} J_2(\vec{x}, t) + \frac{1}{c} \frac{\partial D_2(\vec{x}, t)}{\partial t}$$

$$\frac{\partial H_2(\vec{x}, t)}{\partial x_1} - \frac{\partial H_1(\vec{x}, t)}{\partial x_2} = \frac{4\pi}{c} J_3(\vec{x}, t) + \frac{1}{c} \frac{\partial D_3(\vec{x}, t)}{\partial t}$$

$$\frac{\partial B_1(\vec{x}, t)}{\partial x_1} + \frac{\partial B_2(\vec{x}, t)}{\partial x_2} + \frac{\partial B_3(\vec{x}, t)}{\partial x_3} = 0$$

$$\frac{\partial E_3(\vec{x}, t)}{\partial x_2} - \frac{\partial E_2(\vec{x}, t)}{\partial x_3} + \frac{1}{c} \frac{\partial B_1(\vec{x}, t)}{\partial t} = 0$$

$$\frac{\partial E_1(\vec{x}, t)}{\partial x_3} - \frac{\partial E_3(\vec{x}, t)}{\partial x_1} + \frac{1}{c} \frac{\partial B_2(\vec{x}, t)}{\partial t} = 0$$

```

Kommandos
partial func D_1(vec x", "t) over {partial x_1} + {partial func D_2(vec x", "t) over {partial x_2} + {partial func D_3(vec x", "t) over
partial x_3} ~ = ~ 4 %pi %rho(vec x", "t) newline
partial func H_3(vec x", "t) over {partial x_2} - {partial func H_2(vec x", "t) over {partial x_3} ~
= - {{4 %pi} over c} func J_1(vec x", "t) + {1 over c} {partial func D_1(vec x", "t) over {partial t} newline
partial func H_1(vec x", "t) over {partial x_3} - {partial func H_3(vec x", "t) over {partial x_1} ~
= - {{4 %pi} over c} func J_2(vec x", "t) + {1 over c} {partial func D_2(vec x", "t) over {partial t} newline
partial func H_2(vec x", "t) over {partial x_1} - {partial func H_1(vec x", "t) over {partial x_2} ~
= - {{4 %pi} over c} func J_3(vec x", "t) + {1 over c} {partial func D_3(vec x", "t) over {partial t} newline
partial func B_1(vec x", "t) over {partial x_1} + {partial func B_2(vec x", "t) over {partial x_2} +
partial func B_3(vec x", "t) over {partial x_3} ~ = ~ 0 newline
    
```



# Integralform

$$\oint_S \vec{D}(\vec{x}, t) \cdot \vec{n}(\vec{x}) d\vec{f} = 4\pi \int_V \rho(\vec{x}, t) d^3x$$

$$\oint_S \vec{B}(\vec{x}, t) \cdot \vec{n}(\vec{x}) d\vec{f} = 0$$

$$\oint_C \vec{H}(\vec{x}, t) \cdot d\vec{l} = \int_S \left[ \frac{4\pi}{c} \vec{j}(\vec{x}, t) + \frac{1}{c} \frac{\partial \vec{D}(\vec{x}, t)}{\partial t} \right] \cdot \vec{n}(\vec{x}) d\vec{f}$$

$$\oint_C \vec{E}(\vec{x}, t) \cdot d\vec{l} = -\frac{1}{c} \int_S \frac{\partial \vec{B}(\vec{x}, t)}{\partial t} \cdot \vec{n}(\vec{x}) d\vec{f}$$

Kommandos

```

\int csub S \widevec func D(\vec x", "t) \cdot \widevec func n(\vec x) df ~ ~ 4 %pi \int csub V %rho(\vec x", "t) d^{3}x newline
\int csub S \widevec func B(\vec x", "t) \cdot \widevec func n(\vec x) df ~ ~ 0 newline
\int csub C \widevec func H(\vec x", "t) \cdot d \vec l ~ ~
\int csub S \left[ \frac{4 %pi}{c} \widevec func j(\vec x", "t) + \frac{1}{c} \frac{\partial \widevec func D(\vec x", "t)}{\partial t} \right] \cdot \widevec func n(\vec x) df newline
\int csub C \widevec func E(\vec x", "t) \cdot d \vec l ~ ~ - \frac{1}{c} \int csub S \left[ \frac{\partial \widevec func B(\vec x", "t)}{\partial t} \right] \cdot \widevec func n(\vec x) df
    
```





# PAULI-Matrizen

$$\sigma_x = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}, \quad \sigma_y = \begin{pmatrix} 0 & -i \\ i & 0 \end{pmatrix}, \quad \sigma_z = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix} \quad \uparrow$$
$$\vec{S} \equiv \frac{\hbar}{2} \vec{\sigma}$$

```
Kommandos
%sigma_x = left(matrix{0 # 1 ## 1 # 0} right), ~
%sigma_y = left(matrix{0 # -i ## i # 0} right), ~
%sigma_z = left(matrix{1 # 0 ## 0 # -1} right) newline

widevec S ~def~ {hbar over 2}` widevec %sigma
```



# HEISENBERGS Antiferromagnet

$$\Omega_N = \sum_{a_1, \dots, a_N \in \mathbb{Z}^y} a_{a_1, \dots, a_N} S_{+a_1} \dots S_{+a_N} \Omega_f$$

$$\forall l \in \mathbb{Z}^y: \gamma_N(l) \stackrel{\text{def}}{=} \frac{1}{\|\Omega_N\|^2} (\Omega_N | S_{z_0} S_{z_1} \Omega_N) \Rightarrow$$

$$\gamma_N(l) = -\frac{1}{4} + \frac{1}{2} (N-1) \frac{\sum_{\substack{a_1, \dots, a_{N-2} \in \mathbb{Z}^y \\ a_{N-1} = l}} |a_{a_1, \dots, a_{N-2}, 0}|^2}{\sum_{\substack{m_1, \dots, m_{N-1} \in \mathbb{Z}^y \\ m_{N-1} = 0}} |a_{m_1, \dots, m_{N-1}, 0}|^2} \quad \forall l \in \mathbb{Z}^y \setminus \{0\}$$

$$\gamma_N(0) = \frac{1}{4}$$

```

Kommandos
%OMEGA_N ~~~~ sum from{n_1, dotslow, n_N in Z_N^%ny} a_{n_1 dotsaxis n_N}
S_{+n_1} dotsaxis S_{+n_N} %OMEGA_f newline

forall l in setZ^%ny ":" ~~~%gamma_N(l) def 1 over {ldline %OMEGA_N rdline^2}
left( %OMEGA_N mline S_{z_0} S_{z_1} %OMEGA_N right) ~~~~~ darrow newline

%gamma_N(l) = -{1 over 4} + {1 over 2} (N - 1) {sum from {{n_1, dotslow, n_{N-2} in Z_N^%ny} csub {{} <> {}, {} <> 0, 1}}
{abs{a_{n_1 dotsaxis n_{N-2} 0 1}}^2} over {sum from {{m_1, dotslow, m_{N-1} in Z_N^%ny} csub {{} <> {}, {} <> 0}}
{abs{a_{m_1 dotsaxis m_{N-1} 0}}^2}} ~~~~~ forall l in setZ^%ny setminus lbrace 0 rbrace newline

%gamma_N(0) = 1 over 4
    
```



# Schwarzes Loch

$$\square_g \xi_{\beta\gamma} \stackrel{\text{def}}{=} \xi^{\kappa\lambda} \xi_{\beta\gamma, \kappa, \lambda}$$

$$R_{\beta\gamma} \stackrel{\text{def}}{=} \frac{1}{2} \square_g \xi_{\beta\gamma} + \frac{1}{2} \xi^{\kappa\lambda} \left[ \xi_{\kappa\lambda, \beta, \gamma} - \xi_{\kappa\beta, \lambda, \gamma} - \xi_{\kappa\gamma, \lambda, \beta} \right]$$

$$R^{\alpha\beta} - \frac{1}{2} R^\sigma{}_\sigma g^{\alpha\beta} + \Lambda g^{\alpha\beta} = \kappa T^{\alpha\beta}$$

$$g_2^0 = c^2 dt^2 \left( 1 - \frac{2m}{r} \right) - \frac{dr^2}{1 - \frac{2m}{r}} - r^2 d\omega^2$$

```

Kommandos
%dalembert_g_g_{%beta%gamma} ~def~ g^{%kappa%lambda} g_{%beta%gamma", "%kappa", "%lambda} newline
R_{%beta%gamma} ~def~ 1 over 2 %dalembert_g_g_{%beta%gamma} +
1 over 2 g^{%kappa%lambda} left [g_{%kappa%lambda", "%beta", "%gamma} -
g_{%kappa%beta", "%lambda", "%gamma} - g_{%kappa%gamma", "%lambda", "%beta}right ] newline
R^{%alpha%beta} - 1 over 2 {R^{%sigma}_%sigma} g^{%alpha%beta} + %LAMBDA g^{%alpha%beta} ~~~
%kappa T^{%alpha%beta} newline newline
{g_2}^0 ~~~ c^2 dt^2 left (1 - {2 m} over r right) ~~~ dr^2 over {1 - {2 m} over r} ~~~ r^2 d%omega^2
    
```



# GRIEGERSches Theorem

Behauptung:  $\rightarrow \cos(x) = 1 \quad \forall x \in \mathbb{R} \quad \uparrow$

Beweis:  $\uparrow$

$$\begin{aligned} \forall x \in \mathbb{R}: \\ \cos(x) + i \sin(x) &= e^{i x} && \text{Eulersche Formel} \\ &= e^{\frac{x}{2\pi} 2\pi i} \\ &= \left( e^{2\pi i} \right)^{\frac{x}{2\pi}} \\ &= \left( 1 \right)^{\frac{x}{2\pi}} = 1 && \Rightarrow \\ 1 &= \Re 1 = \Re (\cos(x) + i \sin(x)) = \cos(x) \end{aligned}$$

q. e. d.

Kommandos

```
alignl forall x in setR ". " newline
alignl cos(x) + i sin(x) ~~~ func e^{ix} ~~~~~"Eulersche Formel" newline
alignl phantom {cos(x) + i sin(x)} ~~~ func e^{alignc {x over {2 %pi}} 2 %pi i} newline
alignl phantom {cos(x) + i sin(x)} ~~~ left (func e^{2 %pi i} right)^{alignc{x over {2 %pi}}} newline
alignl phantom {cos(x) + i sin(x)} ~~~ left (1 right)^{alignc{x over {2 %pi}}} ~~~ 1 ~~~~~ drarrow newline newline
alignl 1 ~~~ Re 1 ~~~ Re (cos(x) + i sin(x)) ~~~ cos(x) newline
alignr "q. e. d."
```

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# Ausrichtung von Formeln

Formel ohne Ausrichtung:  
 $a+b=c$   
 $b=c+d+e$

Formel mit phantom-Ausrichtung:  
 $a+b=c$   
 $b=c+d+e$

Formel mit matrix-Ausrichtung:  
 $a+b = c$   
 $b = c+d+e$

```
Kommandos

"Formel ohne Ausrichtung:" newline
a + b = c newline
b = c + d + e newline newline

"Formel mit phantom-Ausrichtung:" newline
alignl a + {} b = c newline
alignl phantom { a + {} } b = c + d + e newline newline

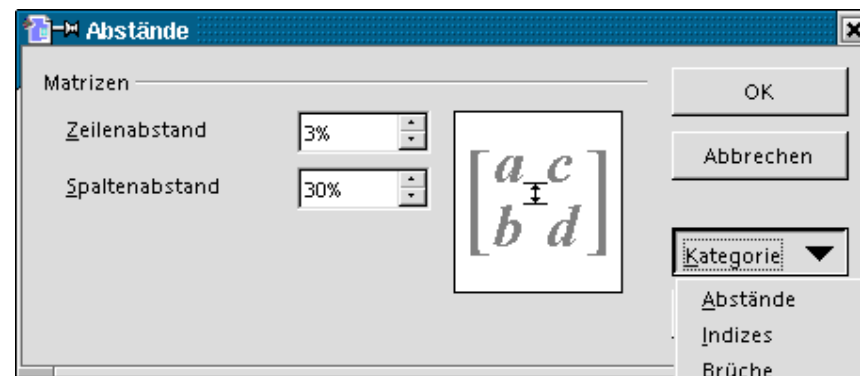
"Formel mit matrix-Ausrichtung:" newline
matrix { alignr a + b # {} = {} # alignl c ##
alignr b # {} = {} # alignl c + d + e }
```



# Änderungen von Größen, Abständen, Schriften

## Format

- **Schriftarten**
- **Schriftgrößen**
- **Abstände**
- **Ausrichtung**





# Größenänderungen

$$\oint_C \vec{E}(\vec{x}, t) \cdot d\vec{l} = -\frac{1}{c} \int_S \frac{\partial \vec{B}(\vec{x}, t)}{\partial t} \cdot \vec{n}(\vec{x}) d\vec{f}$$

$$\oint_C \vec{E}(\vec{x}, t) \cdot d\vec{l} = \frac{1}{c} \int_S \frac{\partial \vec{B}(\vec{x}, t)}{\partial t} \cdot \vec{n}(\vec{x}) d\vec{f}$$

Kommandos

```

\int csub C \widevec func E(\vec x", "t) cdot d \vec l ~ = ~
- {1 over c} \int csub S {{\partial \widevec func B(\vec x", "t)} over {\partial t}} cdot \widevec n(\vec x) df newline

{size+10 \int {} } csub C \widevec func E(\vec x", "t) cdot d \vec l ~ = ~
{1 over c} {size+10 \int {} } csub S {{\partial \widevec func B(\vec x", "t)} over {\partial t}} cdot \widevec n(\vec x) df
    
```



# Schriftauszeichnungen

The image shows a screenshot of a software interface. At the top, a window displays four versions of the mathematical formula  $(a+b)^2 = a^2 + 2ab + b^2$ . The first three are plain text. The fourth is rendered with bold, italicized, and red text, and is centered. Below this window is a text area titled 'Kommandos' containing the LaTeX commands used to create each version of the formula:

```
{a+b}^2 = a^2 + 2 a b + b^2 newline  
{bold a+b}^2 = {bold a}^2 + 2 bold a b + b^2 newline  
{nitalic a+b}^2 = {nitalic a}^2 + 2 nitalic a b + b^2 newline  
left (color red bold size+10 a + b right )^2 = {color red bold size+10 a}^2 + 2 color red bold size+10 a b + b^2
```





# Verwendung von Schriften

$(a+b)^2 = a^2 + 2ab + b^2$	a Standard
$(\bar{a}+b)^2 = a^2 + 2ab + b^2$	a sans
$(a+b)^2 = a^2 + 2ab + b^2$	a serif
$(\underline{a}+b)^2 = a^2 + 2ab + b^2$	a fixed

Kommandos

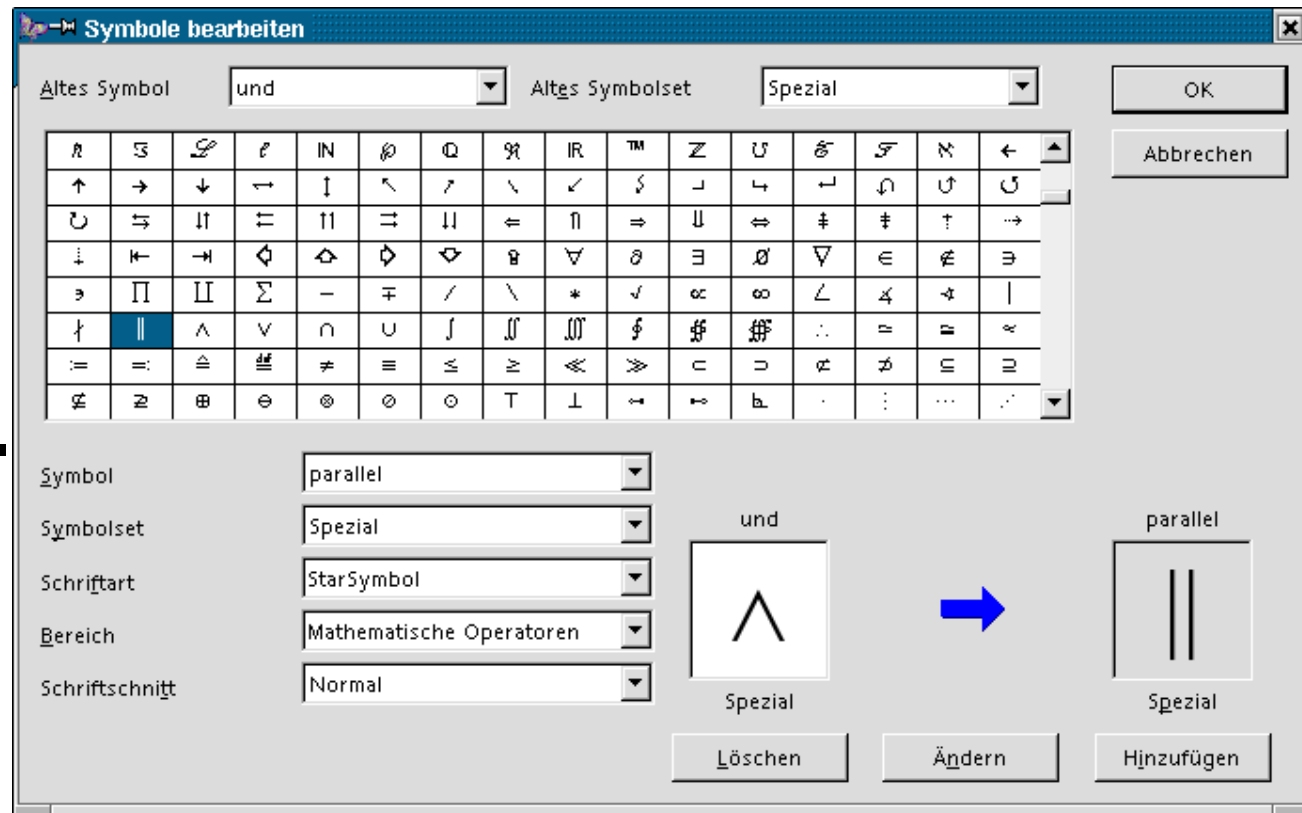
```
(a+b)^2 = a^2 + 2 a b + b^2 ~~~~~ "a Standard" newline newline  
(font sans a+b)^2 = {font sans a}^2 + 2 {font sans a} b + b^2 ~~~~~ "a " font sans "sans" newline newline  
(font serif a+b)^2 = {font serif a}^2 + 2 {font serif a} b + b^2 ~~~~~ "a " font serif "serif" newline newline  
(font fixed a+b)^2 = {font fixed a}^2 + 2 {font fixed a} b + b^2 ~~~~~ "a " font fixed "fixed"
```



# Hinzufügen von Zeichen

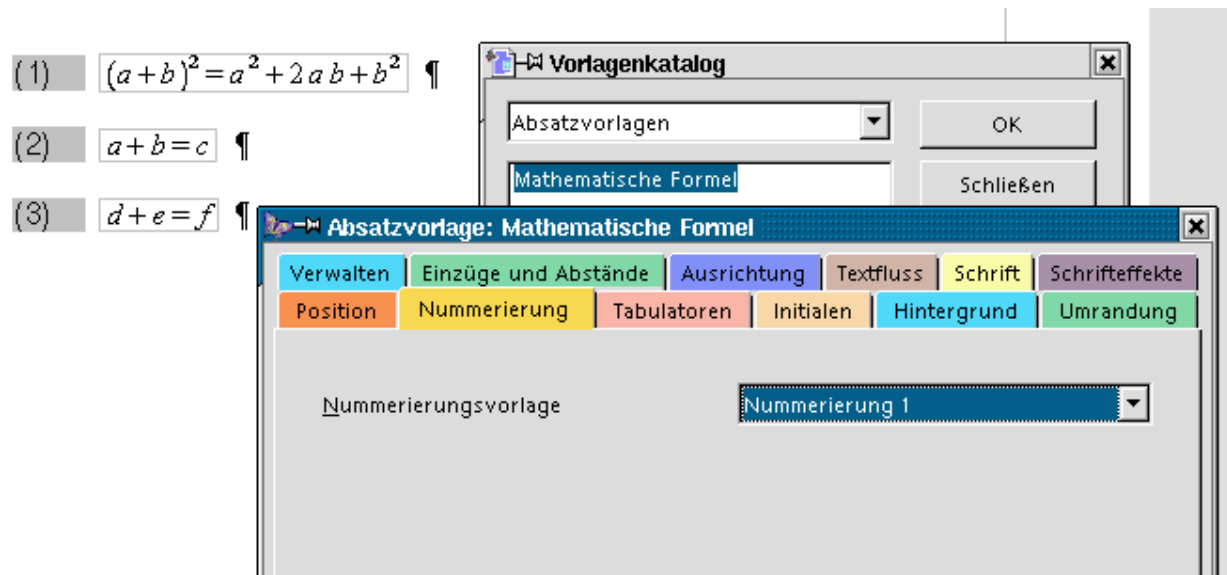
Extras

→  $\Sigma$  Katalog Bearbeiten ...





# Automatische Nummerierung

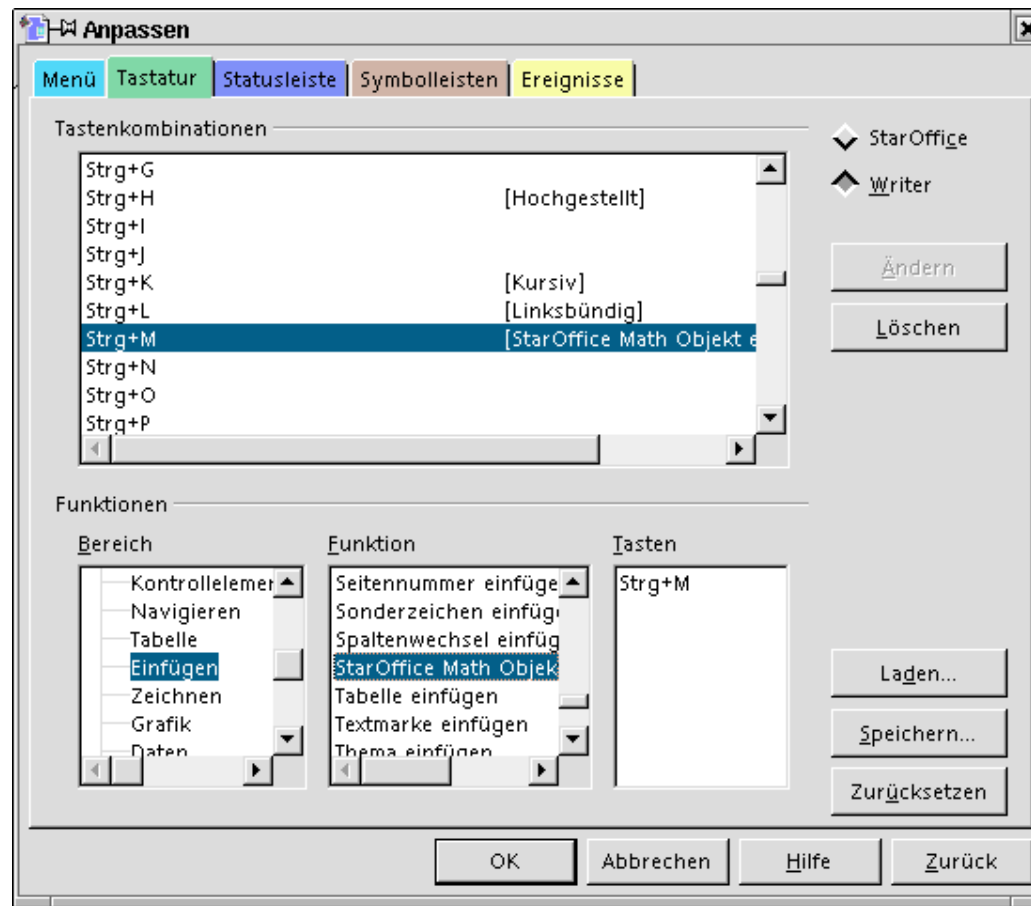




# Tastaturbelegung

Extras

→ Anpassen





# StarOffice und XML

```
wgrieger@PCGrieger.gwdg.de
wgrieger@PCGrieger:~/Kurse/StarOffice/XML > ls -l
insgesamt 8
-rw----- 1 wgrieger GWGD      7228 Mär 31 19:11 ein_beispiel.sxw
wgrieger@PCGrieger:~/Kurse/StarOffice/XML > unzip ein_beispiel.sxw
Archive:  ein_beispiel.sxw
  inflating: content.xml
  inflating: 0bjBFFDFE1/content.xml
  inflating: 0bjBFFDFE1/settings.xml
  inflating: styles.xml
  extracting: meta.xml
  inflating: settings.xml
  inflating: META-INF/manifest.xml
wgrieger@PCGrieger:~/Kurse/StarOffice/XML > more 0bjBFFDFE1/content.xml
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE math:math PUBLIC "-//OpenOffice.org//DTD Modified W3C MathML 1.01//EN"
 "math.dtd"><math:math xmlns:math="http://www.w3.org/1998/Math/MathML"><math:sem
antics><math:mrow><math:mrow><math:msup><math:mrow><math:mo math:stretchy="false
">î
<math:mo><math:mi>b</math:mi></math:mrow><math:mo math:stretchy="false">î
</math:mrow><math:mn>2</math:mn></math:msup><math:mo math:stretchy="false">=</ma
th:mo><math:mrow><math:msup><math:mi>a</math:mi><math:mn>2</math:mn></math:msup>
<math:mo math:stretchy="false">î </math:mo><math:mn>2</math:mn></math:mrow></sh
:mrow><math:mi>a</math:mi><math:mrow><math:mi>b</math:mi><math:mo math:stretchy="
false">î </math:mo><math:msup><math:mi>b</math:mi><math:mn>2</math:mn></math:u
p></math:mrow></math:mrow><math:annotation math:encoding="StarMath 5.0">(a + b)^
2 = a^2 + 2 a b + b^2</math:annotation></math:semantics></math:math>
wgrieger@PCGrieger:~/Kurse/StarOffice/XML >
```