## 0.1 General Information

The files *math.sty* and *preamble.sty* should provide you a simple yet effectie suite of macros for quick writing of mathematical/scientific papers. To properly load them you should include the following in your preamble:

```
\usepackage{preamble}
\usepackage{math}
```

It is important that you maintain the order of the packags, since math.sty uses some packages included in preamble.sty. Other than providing an extensive list of mathematical operators from math, there are some useful commands in preamble.sty too. The one that I myself use quite often is `\col{<color>}{<text>}`. Altough xcolor defines `\textcolor`, it can get kind of "clunky" in tables or similar, so i wrote a shorter command.

## 0.2 Symbol Index

| **Symbol** | **Math-Mode** | **Result** | **Symbol** | **Math-Mode** | **Result** |
|---|---|---|---|---|---|
| **Symbol** | | | **Math-Mode** | **Result** | |
| *Vectors* | | | | | |
| Column Vector | `\pvec{x_1}{x_2}` | $\begin{pmatrix} x_1 \\ x_2 \end{pmatrix}$ | Dot-Product | `\dotp{x_1}{x_2}` | $\langle x_1, x_2 \rangle$ |
| Column Vector | `\tvec{x_1}{x_2}{x_3}` | $\begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix}$ | | | |
| *Matrices* | | | | | |
| Bold faced Matrix | `\mat{M}` | $\mathbf{M}$ | Determinant | `\det` | det |
| Matrix-Rank (de) | `\Rang` | Rang | Matrix-Rank (en) | `\Rank` | Rank |
| Matrix-Trace (de) | `\Spur` | Spur | Matrix-Trace (en) | `\Trace` | Trace |
| Adjunct-Matrix | `\Adj` | Adj | Cofactor-Matrix | `\Cof` | Cof |
| Identity-Matrix (de) | `\imate` | $\mathbf{E}$ | Identity-Matrix (en) | `\imati` | $\mathbf{I}$ |
| *Calculus and Functions* | | | | | |
| Differential d | `\diff` | d | Divergence | `\divs` | div |
| Derivative | `\der{f}{x}` | $\frac{\mathrm{d}f}{\mathrm{d}x}$ | Partial Derivative | `\per{f}{x_1}` | $\frac{\partial f}{\partial x_1}$ |
| n-th Derivative | `\ner{f}{x}{n}` | $\frac{\mathrm{d}^n f}{\mathrm{d}x^n}$ | n-th Partial Derivative | `\pnr{f}{x_1}{n}` | $\frac{\partial^n f}{\partial x_1^n}$ |
| Curl (de) | `\rot` | rot | Curl (en) | `\curl` | curl |
| Limit (noarg) | `\lims` | lim | Limit | `\lim{n}{\infty}` | $\lim\limits_{n\to\infty}$ |
| Infimum (noarg) | `\infs` | inf | Infimum | `\inf{M}` | $\inf(M)$ |
| Supremum (noarg) | `\sups` | sup | Supremum | `\sup{M}` | $\sup(M)$ |
| Limes Inferior (noarg) | `\liminfs` | lim inf | Limes Inferior | `\liminf{n}{\infty}` | $\liminf\limits_{n\to\infty}$ |
| Limes Superior (noarg) | `\limsups` | lim sup | Limes Superior | $\limsup\limits_{n\to\infty}$ | $\limsup\limits_{n\to\infty}$ |
| Function Image (de) | `\Bild` | Bild | Function Image (en) | `\Img` | Img |
| Area Sinus hyperbolicus | `\Arsinh` | Arsinh | | | |
| Area Cosinus hyperbolicus | `\Arcosh` | Arcosh | | | |
| Area Tangens hyperbolicus | `\Artanh` | Artanh | | | |
| Area Cotanges hyperbolicus | `\Arcoth` | Arcoth | | | |
| Arcus Cotanges | `\arccot` | arccot | | | |

| | | | | | |
|---|---|---|---|---|---|
| | | *Logic* | | | |
| Bijunction | `\bij` | $\leftrightarrow$ | | | |
| Equivalent | `\eqv` | $\Leftrightarrow$ | Not Equivalent | `\neqv` | $\not\Leftrightarrow$ |
| Right Subjunction | `\subj` | $\rightarrow$ | Left Subjunction | `\lsubj` | $\leftarrow$ |
| Not Right Subjunction | `\nsubj` | $\not\rightarrow$ | Not Left Subjunction | `\nlsubj` | $\not\leftarrow$ |
| Right Implication | `\implies` | $\Rightarrow$ | Left Implication | `\limplies` | $\Leftarrow$ |
| Not Right Implication | `\nimplies` | $\not\Rightarrow$ | Not Left Implication | `\nlimplies` | $\not\Leftarrow$ |
| Symbol for True (de) | `\dtrue` | W | Symbol for True (en) | `\etrue` | T |
| Symbol for False (de) | `\dfalse` | F | Symbol for False (en) | `\efalse` | F |
| | | *Equations* | | | |
| Should be equal to | `\feq` | $\overset{!}{=}$ | | | |
| | | *Constants* | | | |
| Imaginary Unit | `\i` | i | Jimaginary Unit (EE) | `\j` | j |
| Euler's Number | `\e` | e | | | |
| | | *Number Theory* | | | |
| GCD (de) | `\ggT` | ggT | GCD (en) | `\gcd` | gcd |
| LCM (de) | `\kgV` | kgV | LCM (en) | `\lcm` | lcm |
| | | *Signal Transforms* | | | |
| Laplace-Transformed | `\ltr{x}` | $\overline{x}$ | Z-Transformed | `\ztr{x}` | $\tilde{x}$ |
| Laplace-Transformation | `\lap{x}` | $\mathcal{L}\{x\}(s)$ | Z-Transformed | `\zat{x}` | $\mathcal{Z}\{x\}(z)$ |
| Fourier-Transformation | `\frt` | $\overset{\text{FT}}{\longleftrightarrow}$ | Fourier-Transformation | `\fat{x}` | $\mathcal{F}\{x\}(\omega)$ |
| Fourier-Series (de) | `\frr` | $\overset{\text{FR}}{\longleftrightarrow}$ | Fourier-Series (en) | `\frs` | $\overset{\text{FS}}{\longleftrightarrow}$ |
| DFT | `\dft` | $\overset{\text{DFT}}{\longleftrightarrow}$ | DTFT | `\dtft` | $\overset{\text{DTFT}}{\longleftrightarrow}$ |
| | | *Custom TikZ-Symbols for Signal Transforms* | | | |
| Laplace-Transformation | `\ltransf` | ○—● | Inverse Laplace-Transformation | `\Ltransf` | ●—○ |
| Z-Transformation | `\ztransf` | □—■ | Inverse Z-Transformation | `\Ztransf` | ■—□ |
| | | *Sets* | | | |
| Natural Numbers | `\N` | $\mathbb{N}$ | Integers | `\Z` | $\mathbb{Z}$ |
| Rational Numbers | `\Q` | $\mathbb{Q}$ | Irrational Numbers | `\I` | $\mathbb{I}$ |
| Real Numbers | `\R` | $\mathbb{R}$ | Complex Numbers | `\C` | $\mathbb{C}$ |
| Set of Primes | `\P` | $\mathbb{P}$ | Transcendetal Numbers | `\T` | $\mathbb{T}$ |
| General Field (de) | `\K` | $\mathbb{K}$ | General Field (en) | `\F` | $\mathbb{F}$ |

Table 1: All symbols and operators from math.sty

As you might have noticed, some of the entries in the table above feature either (de) or (en). These typically refer to language-dependet Operators. A classic example is the Curl of a Vector-Field. In English, the operator is either $\nabla \times \mathbf{V}$ or curl($\mathbf{V}$). In German however, the cross-prodcut $\nabla \times \mathbf{V}$ ist referred to as *Rotation von* $\mathbf{V}$[1]. Hence the Operator rot($\mathbf{V}$).

There also exist some limits which take no arguments, which is listed with (noarg). This was mostly done to provide a simple text command for just the operator. If you e.g. just want to write: *The limes superior refers to the largest …* and want to use the symbol lim sup in text without any subscript.

[1] Rotation of $\mathbf{V}$

## 0.3 A Word on Tables

Tables in LaTeXcan be quite a pain, especially correct vertical spacing and alignemnt. To avoid maximum frustration, the package `cellspace` is loaded. It allows to define a minimal distance to the top and the bottom of a row. To enable this functionality in your tables, you need to modify your column-list by adding `S` in front of your column type, e.g. `\begin{tabular}{Sc Sl Sr}`. **Note:** If you have `siunitx` loaded[2] you need to write `Cc` instead.

The standard value for space to top/bottom is 4pt. You can change this by modifying the corresponging commands in preamble.sty:

- `\setlength\cellspacetopline` controls the spacing to the top
- `\setlength\cellspacebottomline` controls the spacing to the bottom

preamble also includes the `longtable` package. This allows for tables to perform pagebreak. A pagebreak can be manually inserted by typing `\pagebreak` in the table-contents. In order for this to work, the longtable-environment mustn't be in a table-environment. So wrap your longtable in a center and put the caption as a row element.

[2] preamble loads this package