GSNS LaTeX course

TEXniCie

8 September 2022

Slides are available at
a-eskwadraat.nl/latex

Schedule

- Introduction
- Text formatting
- Structure of a document
- ⟨Exercises!⟩
- Images
- Formulas
- ⟨Exercises!⟩
- Closing remarks

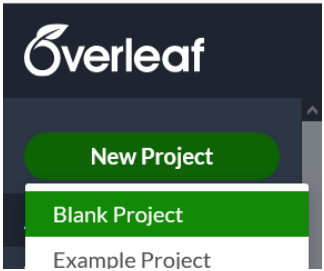
Overleaf

LaTeX is the programming language.

Overleaf is a website where you can write and compile LaTeX.

Visual Studio Code is a desktop app where you can write and compile LaTeX.

MiKTeX does compilation for Visual Studio code.



For now: Overleaf.

Want VS Code? Instructions at
`vkuhlmann.com/latex/installation`

Simple document

```
\documentclass{article}
\usepackage[utf8]{inputenc}

\title{My document}
\author{Vincent Kuhlmann}
\date{1 May 2021}

\begin{document}
\maketitle
\section{Introduction}

Hello everyone!
\end{document}
```

My document

Vincent Kuhlmann

7 September 2021

1 Introduction

Hello everyone!

```
Lorem ipsum \tiny dolor sit amet, consectetur adipiscing
elit. Phasellus elementum, lacus quis tempus
scelerisque, elit diam vulputate ex, semper elementum
massa odio in ante.
```

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Phasellus elementum, lacus quis tempus scelerisque, elit diam vulputate ex, semper elementum massa odio in ante.

```
Lorem {ipsum \tiny dolor sit ame}t, consectetur
adipiscing elit. Phasellus {elementum}, lacus quis
tempus scelerisque, {elit diam vulputate ex, semper}
elementum massa odio in ante.
```

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Phasellus elementum, lacus quis tempus scelerisque, elit diam vulputate ex, semper elementum massa odio in ante.

Paragraphs

```
Lorem ipsum dolor sit amet,
... ornare sit amet.
In ipsum ante, sollicitudin
... sit amet augue.
```

```
Lorem ipsum dolor sit amet,
... ornare sit amet.

In ipsum ante, sollicitudin
... sit amet augue.
```

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Integer id erat leo. Suspendisse sit amet ligula turpis. Duis congue turpis odio, non ornare elit ornare sit amet. In ipsum ante, sollicitudin at euismod vitae, tincidunt vitae massa. Aenean metus lectus, porta at tempor at, dapibus sit amet augue.

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Integer id erat leo. Suspendisse sit amet ligula turpis. Duis congue turpis odio, non ornare elit ornare sit amet.

In ipsum ante, sollicitudin at euismod vitae, tincidunt vitae massa. Aenean metus lectus, porta at tempor at, dapibus sit amet augue.

Paragraphs

```
...
\usepackage{parskip}
\begin{document}
Lorem ipsum dolor sit amet,
... ornare sit amet.

In ipsum ante, sollicitudin
... sit amet augue.
\end{document}
```

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Integer id erat leo. Suspendisse sit amet ligula turpis. Duis congue turpis odio, non ornare elit ornare sit amet.

In ipsum ante, sollicitudin at euismod vitae, tincidunt vitae massa. Aenean metus lectus, porta at tempor at, dapibus sit amet augue.

Lists

```
These are the ingredients:
\begin{itemize}
    \item Carrots
    \begin{enumerate}
        \item Buy
        \item Peel
        \item Chop
    \end{enumerate}
    \item Onions

    Lipsum dolor sit amet.
    \item Potatoes
\end{itemize}
```

These are the ingredients:

- Carrots
  1. Buy
  2. Peel
  3. Chop
- Onions

  Lipsum dolor sit amet.
- Potatoes

Special characters

Code	Result	Code	Result
`\{`	{	`{`	Begin group
`\}`	}	`}`	End group
`\%`	%	`%`	Comment
`\_`	_	`_`	Used in maths
`\textasciicircum`	^	`^`	Used in maths
`\$`	$	`$`	Math mode
`\textbackslash`	\	`\`	Command
`\&`	&	`&`	Column separation
`\#`	#	`#`	Parameter
`\textgreater`	>	`>`	>
`\textless`	<	`<`	<

Comments

```
% TODO Translate to English
\section{Nonsense}

%Lorem ipsum dolor sit amet,
%\textfb{ornare} sit amet.
%
%\subsection{About $\sqrt{2}$}
```

1 Nonsense

Quotes

```
  'LaTeX' : 'LaTeX'
  `LaTeX' : ‘LaTeX’
``LaTeX'': “LaTeX”
```

Simple document

```
\documentclass{article}

\usepackage[utf8]{inputenc}

\title{My document}
\author{Vincent Kuhlmann}
\date{1 May 2021}
```

Preamble

```
\begin{document}
\maketitle
\section{Introduction}

Hello everyone!
\end{document}
```

Document

My document

Vincent Kuhlmann

1 May 2021

1 Introduction

Hallo iedereen!

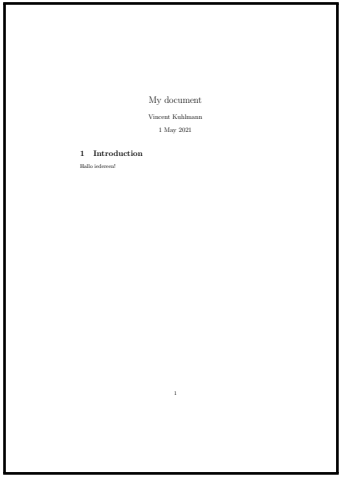
Page margins

```
\documentclass{article}
\usepackage[utf8]{inputenc}

\title{My document}
\author{Vincent Kuhlmann}
\date{1 May 2021}

\begin{document}
    \maketitle
    \section{Introduction}

    Hello everyone!
\end{document}
```



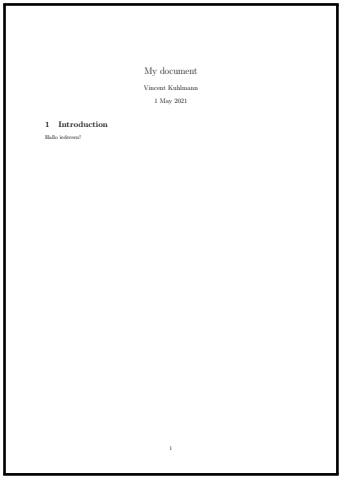
Page margins

```
\documentclass[a4paper]{article}
\usepackage[utf8]{inputenc}
\usepackage[margin=2.54cm]{geometry}

\title{My document}
\author{Vincent Kuhlmann}
\date{1 May 2021}

\begin{document}
    \maketitle
    \section{Introduction}

    Hello everyone!
\end{document}
```



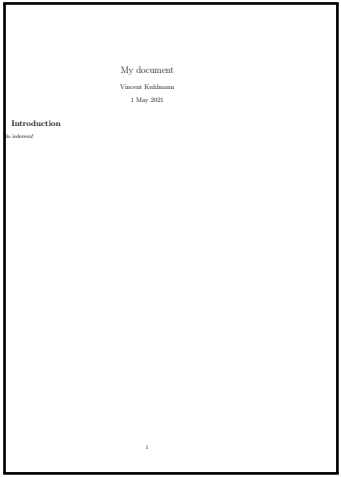
Page margins

```
\documentclass[a4paper]{article}
\usepackage[utf8]{inputenc}
\usepackage[margin=2.54cm,left=-0.5cm]
{geometry}

\title{My document}
\author{Vincent Kuhlmann}
\date{1 May 2021}

\begin{document}
    \maketitle
    \section{Introduction}

    Hello everyone!
\end{document}
```



Contents

```
\begin{document}
    \maketitle
    \tableofcontents

    \section{AA}
    ...
\end{document}
```

Contents

1 AA

Lorem ipsum dolor sit amet, consectetur adipiscing elit.

Contents

```
\begin{document}
    \maketitle
    \tableofcontents
    \newpage

    \section{AA}
    ...
\end{document}
```

Contents

Contents

```
...
\usepackage[dutch]{babel}

\begin{document}
    \maketitle
    \tableofcontents
    \newpage

    \section{AA}
    ...
\end{document}
```

Inhoudsopgave

Partial numbering

```
\setcounter{secnumdepth}{3}
\section{AA}
Lorem ipsum dolor sit amet,
consectetur adipiscing elit.

\section{BB}
\subsection{CC}
\subsubsection{DD}
\subsection{EE}
Nullam a risus at arcu
lobortis viverra vel
volutpat diam.

\section{FF}
\subsubsection{GG}
```

1 AA

Lorem ipsum dolor sit amet, consectetur adipiscing elit.

2 BB

2.1 CC

2.1.1 DD

2.2 EE

Nullam a risus at arcu lobortis viverra vel volutpat diam.

3 FF

3.0.1 GG

Partial numbering

```
\setcounter{secnumdepth}{2}
\section{AA}
Lorem ipsum dolor sit amet,
consectetur adipiscing elit.

\section{BB}
\subsection{CC}
\subsubsection{DD}
\subsection{EE}
Nullam a risus at arcu
lobortis viverra vel
volutpat diam.

\section{FF}
\subsubsection{GG}
```

1 AA

Lorem ipsum dolor sit amet, consectetur adipiscing elit.

2 BB

2.1 CC

DD

2.2 EE

Nullam a risus at arcu lobortis viverra vel volutpat diam.

3 FF

GG

Partial numbering

```
\setcounter{secnumdepth}{1}
\section{AA}
Lorem ipsum dolor sit amet,
consectetur adipiscing elit.

\section{BB}
\subsection{CC}
\subsubsection{DD}
\subsection{EE}
Nullam a risus at arcu
lobortis viverra vel
volutpat diam.

\section{FF}
\subsubsection{GG}
```

1 AA

Lorem ipsum dolor sit amet, consectetur adipiscing elit.

2 BB

CC

DD

EE

Nullam a risus at arcu lobortis viverra vel volutpat diam.

3 FF

GG

Partial numbering

```
\setcounter{secnumdepth}{0}
\section{AA}
Lorem ipsum dolor sit amet,
consectetur adipiscing elit.

\section{BB}
\subsection{CC}
\subsubsection{DD}
\subsection{EE}
Nullam a risus at arcu
lobortis viverra vel
volutpat diam.

\section{FF}
\subsubsection{GG}
```

AA

Lorem ipsum dolor sit amet, consectetur adipiscing elit.

BB

CC

DD

EE

Nullam a risus at arcu lobortis viverra vel volutpat diam.

FF

GG

Partial numbering

```
\section{AA}
Lorem ipsum dolor sit amet,
consectetur adipiscing elit.

\section*{BB}
\subsection*{CC}
\subsubsection{DD}
\subsection*{EE}
Nullam a risus at arcu
lobortis viverra vel
volutpat diam.

\section{FF}
\subsubsection{GG}
```

1 AA

Lorem ipsum dolor sit amet, consectetur adipiscing elit.

BB

CC

1.0.1 DD

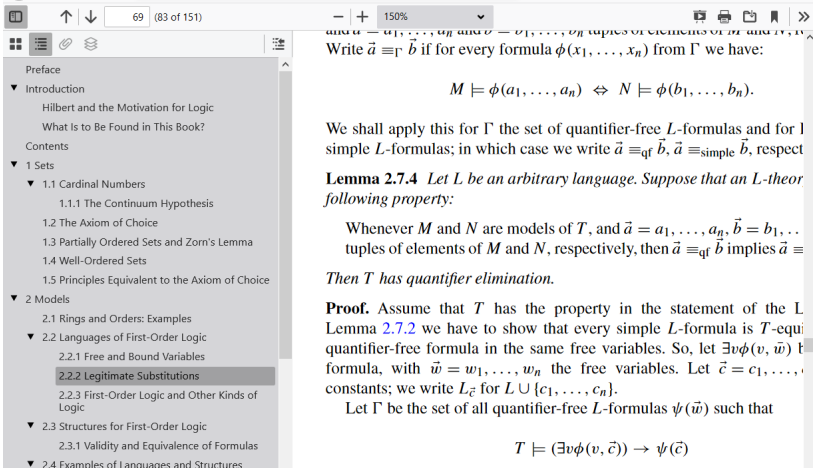
EE

Nullam a risus at arcu lobortis viverra vel volutpat diam.

2 FF

2.0.1 GG

Vincent's favorite package: `\usepackage[bookmarksnumbered]{hyperref}`



A lot of packages

Necessary for examples in this presentation.

Improve page margins, mathematics, pragraph indent, language, images and more.

Find a template including the most important packages from Vincent's website, on

`vkuhlmann.com/latex/example`

\includegraphics

```
Here you see a penguin:
\includegraphics[height=2cm]{penguin.jpg}
Photo by Sue Flood.
```

```
Here you see a penguin:
\includegraphics[height=2cm]{penguin.jpg}
Photo by Sue Flood.
```

Here you see a penguin:  Photo by Sue Flood.

https://www.pinterest.co.kr/pin/645844402812554993/

\includegraphics

```
Here you see a penguin:

\includegraphics[height=2cm]{penguin.jpg}

Photo by Sue Flood.
```

Here you see a penguin:

Photo by Sue Flood.

\includegraphics

```
Here you see a penguin:
\begin{center}
    \includegraphics[height=2cm]{penguin.jpg}
\end{center}
Photo by Sue Flood.
```

Here you see a penguin:

Photo by Sue Flood.

\includegraphics

```
You can see a penguin in Figure~\ref{fig:penguin}.
\begin{figure}[h]
    \centering
    \includegraphics[height=2cm]{penguin.jpg}
    \caption{A cute penguin. Photo by Sue Flood.}
    \label{fig:penguin}
\end{figure}
```

You can see a penguin in Figure 1.

Figure 1: A cute penguin. Photo by Sue Flood.

Figure placement

```
\begin{figure}[h]
```

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.. Zie hiervoor Figuur 1.

Figure 1: Voorbeeld van figuurplaatsing.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Figure placement

```
\begin{figure}[t]
```

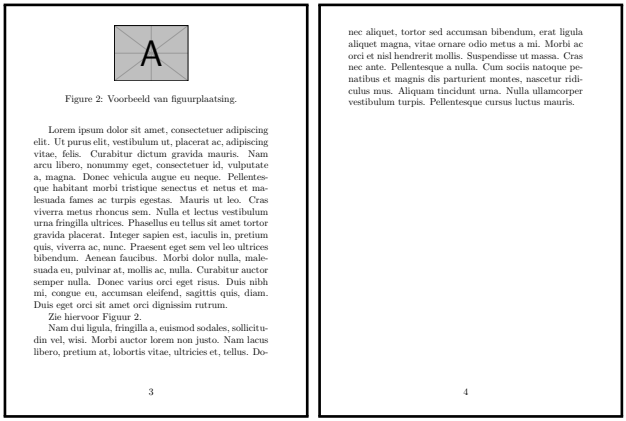


Figure 2: Voorbeeld van figuurplaatsing.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Zie hiervoor Figuur 2.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

3

4

Figure placement

```
\begin{figure}[b]
```

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Zie hiervoor Figuur 3.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Do-

Figure 3: Voorbeeld van figuurplaatsing.

nec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Figure placement

```
\begin{figure}[p]
```

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Zie hiervoor Figuur 4.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

7

Figure 4: Voorbeeld van figuurplaatsing.

8

Figure placement

- h (HERE): Figure can come here.
- t (TOP): Figure can come at the top of the page.
- b (BOTTOM): Figure can come at the bottom of the page
- p (PAGE): Figure can come on a special page for figures.
- !: Override internal parameters for floats.
- H (HERE): No floating, always here. (`\usepackage{float}`)

When working with images: `\usepackage{graphicx}`

Dimensions

- Full linewidth

```
\includegraphics[width=\linewidth]{assets/pinguin.jpg}
```

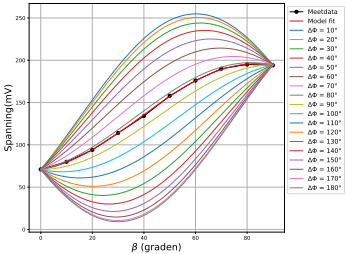
- 90% linewidth

```
\includegraphics[width=0.9\linewidth]{assets/pinguin.jpg}
```

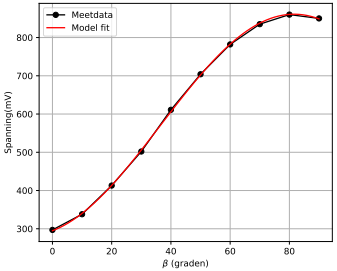
- Width maximally 90% linewidth and height maximally 5 cm

```
\includegraphics[
    width=0.9\linewidth,height=5cm,keepaspectratio
]{assets/penguin.jpg}
```

Subfigure (\usepackage{subcaption})



(a) BB



(b) CC

Figuur 1: Multiple images next to eachother!

Subfigure (\usepackage{subcaption})

```
\begin{figure}[htbp]
    \centering
    \begin{subfigure}[b]{0.45\textwidth}
        \includegraphics[width=\textwidth]{AA}
        \caption{BB}
        \label{fig:dphiExample}
    \end{subfigure}\qquad
    \begin{subfigure}[b]{0.45\textwidth}
        \includegraphics[width=\textwidth]{CC}
        \caption{CC}
        \label{fig:fitExample}
    \end{subfigure}
    \caption{Multiple images next to eachother!}
\end{figure}
```

Formulas: The basics

Formula	Code	Formula	Code
$\sqrt{2}$	`$ \sqrt{2} $`	$\sqrt[3]{8}$	`$ \sqrt[3]{8} $`
$\frac{2}{3}$	`$ \frac{2}{3} $`	x_1	`$ x_1 $`
$6 \geq 3$	`$ 6\geq 3 $`	x_1^2	`$ x_1^2 $`
$a^2 + b^2$	`$ a^2 + b^2 $`	a^{2+b^2}	`$ a^{2 + b^2} $`

`$ x^22 $`: x^22 | `$ x^{22}$`: x^{22}

Formulas: Symbols

Formula	Code	Formula	Code
$x_1, \dots, x_n$	`$ x_1,\dots,x_n $`	$5 \cdot 6$	`$ 5\cdot 6 $`
α, β, γ	`$ \alpha,\beta,\gamma $`	A, B, Γ	`$ A,B,\Gamma $`
ϵ, ε	`$ \epsilon,\varepsilon $`	$\mathcal{P}$	`$ \mathcal{P} $`
ϕ, φ	`$ \phi,\varphi $`	$\mathbb{P}$	`$ \mathbb{P} $`

Formulas: Vectors

Formula	Code	Formula	Code
$\vec{x}$	`$ \vec{x} $`	$\vec{F}_{\text{tot}}$	`$ \vec{F}_{\text{tot}} $`
$\mathbf{x}$	`$ \mathbf{x} $`	$\hat{\imath} + 6\,\hat{k}$	`$ \hat{\imath} + 6\,\hat{k} $`
$\|\vec{x}\|$	`$ \norm{\vec{x}} $`	$\nabla \times \mathbf{A}$	`$ \nabla\times\mathbf{A} $`

$$\vec{F}_{tot}, \vec{F}_{\text{tot}}$$

$sin(x)$

$\vec{F}_{tot}$

```
$ sin(x) $
$ \vec{F}_{tot}$
```

$\sin(x)$

$\vec{F}_{\text{tot}}$

```
$ \sin(x) $
$ \vec{F}_{\text{tot}}$
```

Formulas: Calculus

```
\usepackage{commath}
```

```
\dod{\sin(x)}{x}, \dpd{f(x,y)}{x}, \partial_x f

\int_{0}^{\infty}e^{-x}\dif x = 1
```

$$\frac{\mathrm{d}\sin(x)}{\mathrm{d}x}, \frac{\partial f(x,y)}{\partial x}, \partial_x f$$

$$\int_0^\infty e^{-x}\,\mathrm{d}x = 1$$

Formulas: Mathematical relations

Formula	Code	Formula	Code
$a \leq b$	`$ a \leq b $`	$a \geq b$	`$ a \geq b $`
$a < b$	`$ a < b $`	$a > b$	`$ a > b $`
$a \ll b$	`$ a \ll b $`	$a \gg b$	`$ a \gg b $`
$a = b$	`$ a = b $`	$a \simeq b$	`$ a \simeq b $`
$a \neq b$	`$ a \neq b $`	$a \approx b$	`$ a \approx b $`
$a \sim b$	`$ a \sim b $`	$a \stackrel{*}{=} b$	`$ a \stackrel{*}{=} b $`

Formulas: Arrows and operators

```
\DeclareMathOperator{\Image}{Image}

a \iff b, a\implies b, a\mapsto b
\lim_{x\to 0}\frac{\sin(x)}{x} = 1
\Image(f) = \mathbb{R}_{\geq 0}
```

$$a \iff b, a \implies b, a \mapsto b$$

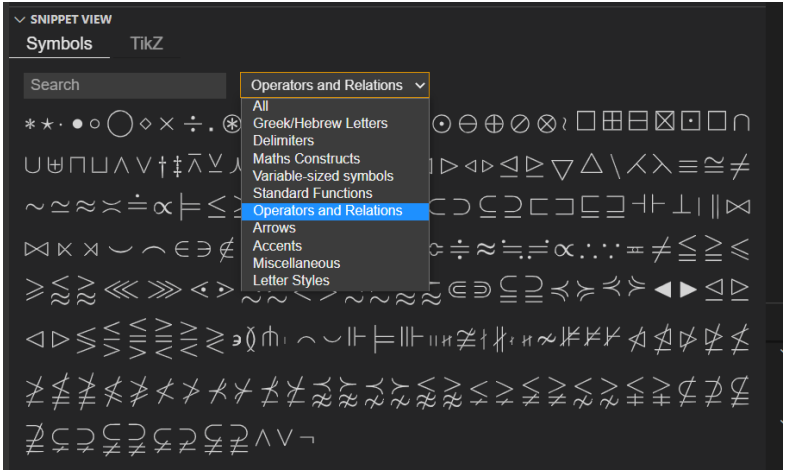
$$\lim_{x \to 0} \frac{\sin(x)}{x} = 1$$

$$\operatorname{Image}(f) = \mathbb{R}_{\geq 0}$$

So many! And there are lots more :-)

CTAN symbol list:
`http://mirrors.ctan.org/info/symbols/comprehensive/symbols-a4.pdf`

Detexify:
`http://detexify.kirelabs.org/classify.html`


SNIPPET VIEW
Symbols
TikZ
Search
Operators and Relations
All
Greek/Hebrew Letters
Delimiters
Maths Constructs
Variable-sized symbols
Standard Functions
Operators and Relations
Arrows
Accents
Miscellaneous
Letter Styles

Equation

```
The trigonometric identity is
$ \sin^2(\theta) + \cos^2(\theta) = 1 $.

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\begin{equation}
    \sin^2(\theta) + \cos^2(\theta) = 1.
\end{equation}
```

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De trigonometric identity is

$$\sin^2(\theta) + \cos^2(\theta) = 1. \tag{1}$$

Align

```
The double-angle formula can now be rewritten as
\begin{align}
    \cos(2\theta) = \cos^2(\theta) - \sin^2(\theta)\\
    = 2\cos^2(\theta)-1.
\end{align}
```

The double-angle formula can now be rewritten as

$$\cos(2\theta) = \cos^2(\theta) - \sin^2(\theta) \tag{1}$$
$$= 2\cos^2(\theta) - 1. \tag{2}$$

Align

```
The double-angle formula can now be rewritten as
\begin{align}
    \cos(2\theta) &= \cos^2(\theta) - \sin^2(\theta)\\
    &= 2\cos^2(\theta)-1.
\end{align}
```

The double-angle formula can now be rewritten as

$$\begin{aligned} \cos(2\theta) &= \cos^2(\theta) - \sin^2(\theta) && (1)\\ &= 2\cos^2(\theta) - 1. && (2) \end{aligned}$$

Align

```
The double-angle formula can now be rewritten as
\begin{align}
    \cos(2\theta) &= \cos^2(\theta) - \sin^2(\theta)
    \nonumber\\
    &= 2\cos^2(\theta)-1.
\end{align}
```

The double-angle formula can now be rewritten as

$$\begin{aligned} \cos(2\theta) &= \cos^2(\theta) - \sin^2(\theta) \\ &= 2\cos^2(\theta) - 1. \end{aligned} \tag{1}$$

Align

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    \cos(2\theta) &= \cos^2(\theta) - \sin^2(\theta)\\
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\end{align*}
```

The double-angle formula can now be rewritten as

$$\begin{aligned}\cos(2\theta) &= \cos^2(\theta) - \sin^2(\theta)\\ &= 2\cos^2(\theta) - 1.\end{aligned}$$

Align

```
We do this with the double-angle formula
\begin{align*}
    \cos(2\theta) &= \cos^2(\theta) - \sin^2(\theta),
\end{align*}
which we can rewrite as
\begin{align*}
    &= \cos^2(\theta) - (1 - \cos^2(\theta))\\
    &= 2\cos^2(\theta)-1.
\end{align*}
```

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$$\cos(2\theta) = \cos^2(\theta) - \sin^2(\theta),$$

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Align

```
We do this with the double-angle formula
\begin{align*}
    \cos(2\theta) &= \cos^2(\theta) - \sin^2(\theta),
\intertext{which we can rewrite as}
    &= \cos^2(\theta) - (1 - \cos^2(\theta))\\
    &= 2\cos^2(\theta)-1.
\end{align*}
```

We do this with the double-angle formula

$$\cos(2\theta) = \cos^2(\theta) - \sin^2(\theta),$$

which we can rewrite as

$$\begin{aligned} &= \cos^2(\theta) - (1 - \cos^2(\theta)) \\ &= 2\cos^2(\theta) - 1. \end{aligned}$$

Also in use

```
AA \(\sqrt{2}\)
BB \[\sqrt{3}\]
CC $$ \sqrt{4} $$
```

AA $\sqrt{2}$ BB

$$\sqrt{3}$$

CC

$$\sqrt{4}$$

Left-right

```
\begin{align*}
    &f(\sum_{i=1}^{n}x_i)\\
    &f\left(\sum_{i=1}^{n}x_i\right)
\end{align*}
```

$$f(\sum_{i=1}^{n} x_i)$$

$$f\left(\sum_{i=1}^{n} x_i\right)$$

Delimiter point

```
\begin{align*}
    \left.\left[x^2\right]\right|_{x=0}^{x=2} = 4
\end{align*}
```

$$\left.\left[x^2\right]\right|_{x=0}^{x=2} = 4,$$

```latex
\begin{align*}
    R(\theta) = \begin{pmatrix}
        \cos(\theta) & -\sin(\theta)\\
        \sin(\theta) & \cos(\theta)
    \end{pmatrix},\quad
    \abs{x} = \begin{cases}
        x & \text{if $ x \geq 0$}\\
        -x & \text{if $ x < 0$}
    \end{cases}
\end{align*}
```

$$R(\theta) = \begin{pmatrix} \cos(\theta) & -\sin(\theta) \\ \sin(\theta) & \cos(\theta) \end{pmatrix}, \quad |x| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases}$$

Chemical formulas \usepackage{mhchem}

```
\ce{CO2 + C -> 2 CO}\\
$\ce{CO2 + C -> 2 CO}$\\
\ce{CH4 + 2 $\left(\ce{O2 + 79/21 N2}\right)$}
%$\ce{CH4 + 2 \left(\ce{O2 + 79/21 N2}\right)}$ % Error
```

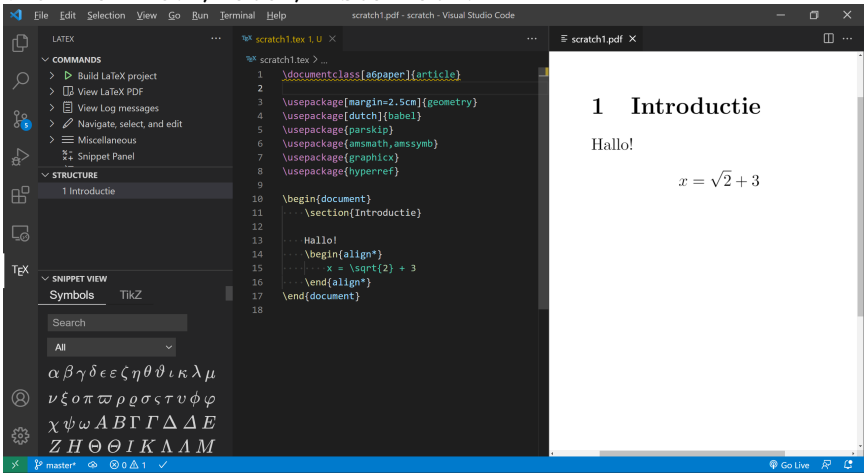
$\ce{CO2 + C -> 2 CO}$\\
$\mathrm{CO_2 + C \longrightarrow 2\,CO}$\\
$\ce{CH4 + 2 $\left(\ce{O2 + 79/21 N2}\right)$}$

Some examples are taken from the `mhchem` package documentation (see below)

More example can be found in the documentation of `mhchem`, see
`https://ctan.org/pkg/mhchem`

Installation

vkuhlmann.com/latex/installation



The end

Questions?

Stuck? Mail us at
texnicie@a-eskwadraat.nl

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