UAV LaTeX-course

Tim Weijers & Vincent Kuhlmann

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Slides are available at
vkuhlmann.com/latex

Schedule

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

LaTeX vs Word

My document

Lorem ipsum

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Aenean commodo ligula eget dolor. Aenean massa. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Donec quam felis, ultricies nec, pellentesque eu, pretium quis, sem. Nulla consequat massa quis enim.

Donec pede justo

Fringilla vel, aliquet nec, vulputate eget, arcu. In enim justo, rhoncus ut, imperdiet a, venenatis vitae, justo.

Nullam dictum felis eu pede mollis pretium. Integer tincidunt.

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} \mathrm{e}^{\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$$

Cras dapibus. Vivamus elementum semper nisi. Aenean vulputate eleifend tellus. Aenean leo ligula, porttitor eu, consequat vitae, eleifend ac, enim. Aliquam lorem ante, dapibus in, viverra quis, feugiat a, tellus.

Figure 1: Bengaalse tijger

My document

Vincent Kuhlmann

3 May 2021

1 Lorem ipsum

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Aenean commodo ligula eget dolor. Aenean massa. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Donec quam felis, ultricies nec, pellentesque eu, pretium quis, sem. Nulla consequat massa quis enim.

1.1 Donec pede justo

Fringilla vel, aliquet nec, vulputate eget, arcu. In enim justo, rhoncus ut, imperdiet a, venenatis vitae, justo.

Nullam dictum felis eu pede mollis pretium. Integer tincidunt.

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2} \tag{1}$$

Cras dapibus. Vivamus elementum semper nisi. Aenean vulputate eleifend tellus. Aenean leo ligula, porttitor eu, consequat vitae, eleifend ac, enim. Aliquam lorem ante, dapibus in, viverra quis, feugiat a, tellus.

Figuur 1: Bengaalse tijger

LaTeX vs Word

Inner workings: big difference.

Word: Edit visually

LaTeX: Edit code (text)

```
\title{My document}
\author{Vincent Kuhlmann}
\date{3 May 2021}

\begin{document}
\maketitle
\section{Lorem ipsum}
Lorem ipsum dolor sit amet, consectetue

\begin{align}
    f(x) = \dfrac{1}{\sigma\sqrt{2\pi}}
        -\frac{1}{2}\left(\frac{x-\mu}{
\end{align}
```

My document

Vincent Kuhlmann

3 May 2021

1 Lorem ipsum

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Aenean commodo ligula eget dolor. Aenean massa. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Donec quam felis, ultricies nec, pellentesque eu, pretium quis, sem. Nulla consequat massa quis enim.

1.1 Donec pede justo

Fringilla vel, aliquet nec, vulputate eget, arcu. In enim justo, rhoncus ut, imperdiet a, venenatis vitae, justo.

Nullam dictum felis eu pede mollis pretium. Integer tincidunt.

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2} \quad (1)$$

Cras dapibus. Vivamus elementum semper nisi. Aenean vulputate eleifend tellus. Aenean leo ligula, porttitor eu, consequat vitae, eleifend ac, enim. Aliquam lorem ante, dapibus in, viverra quis, feugiat a, tellus.

Figuur 1: Bengaalse tijger

Code vs Visual

```
\begin{lemma}
    Lorem ipsum dolor sit
    ... eget dolor.

    \begin{proof}
        Aenean massa. Cum
        ... quis enim.
    \end{proof}
\end{lemma}
```

Lemma 1.9. *Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Aenean commodo ligula eget dolor.*

Proof. Aenean massa. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Donec quam felis, ultricies nec, pellentesque eu, pretium quis, sem. Nulla consequat massa quis enim. □

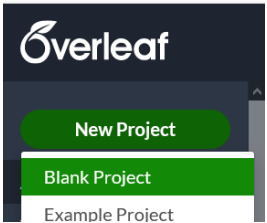
Overleaf

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!

Text effects

Result	Code	Result	Code
Text		`Text`	
Text		Text	
TEXT		Text	
Text		Text	

Text effects

Result	Code	Result	Code
Text	`\textbf{Text}`	`Text`	
Text		Text	
TEXT		Text	
Text		Text	

bf = **b**old**f**ace | **it** = **it**alics | **sc** = **s**mall**c**aps | **tt** = **t**ele**t**ype (a.k.a. monospace)

Text effects

Result	Code	Result	Code
Text	`\textbf{Text}`	Text	`\texttt{Text}`
Text	`\textit{Text}`	Text	`{\tiny Text}`
TEXT	`\textsc{Text}`	Text	`{\LARGE Text}`
Text	`\underline{Text}`	Text	`\textcolor{red}{Text}` [1]

Huge, huge, LARGE, Large, large, normalsize, small, footnotesize, scriptsize, tiny

[1] `\usepackage{xcolor}`

```
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, 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

```
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.

Paragraphs

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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,
... 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.

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{enumerate}
    \item Carrots
    \item Onions

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

These are the ingredients:

1. Carrots
2. Onions

   Lipsum dolor sit amet.

3. Potatoes

Lists

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

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

These are the ingredients:

1. Carrots
   (a) Buy
   (b) Peel
   (c) Chop
2. Onions

   Lipsum dolor sit amet.
3. Potatoes

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

Lists

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

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

These are the ingredients:

- Carrots
  - Buy
  - Peel
  - 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	<	<	<

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

```
% Make soul package work in beamer presentations
% Source: https://tex.stackexchange.com/...
\let\UL\ul
\makeatletter
\renewcommand\ul{
    \let\set@color\beamerorig@set@color
    \let\reset@color\beamerorig@reset@color
    \UL
}
...
```

Comments

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

Lorem ipsum dolor sit amet,
\textfb{ornare} sit amet.

\subsection{About $\sqrt{2}$}
```

Error! Undefined control sequence

Comments

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

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

1 Nonsense

Comments

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

Lorem ipsum dolor sit amet,
\textfb{ornare} sit amet.

%\subsection{About $\sqrt{2}$}
```

Error! Undefined control sequence

Comments

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

Lorem ipsum dolor sit amet,
\textbf{ornare} sit amet.

\subsection{About $\sqrt{2}$}
```

1 Nonsense

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

1.1 About $\sqrt{2}$

Quotes

'LaTeX' : 'LaTeX'

`LaTeX' : ‘LaTeX’

``LaTeX'': “LaTeX”

Simple document

```
\documentclass{article}

\usepackage[utf8]{inputenc}

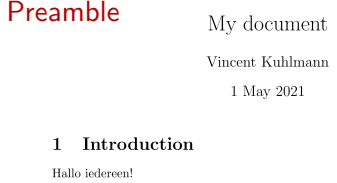
\title{My document}
\author{Vincent Kuhlmann}
\date{1 May 2021}
```

Preamble

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

Hello everyone!
\end{document}
```

Document



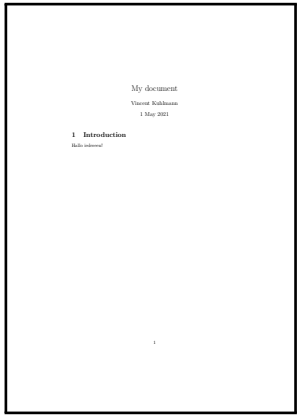
Page margins

```
\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}
```

Section commands

```
\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

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

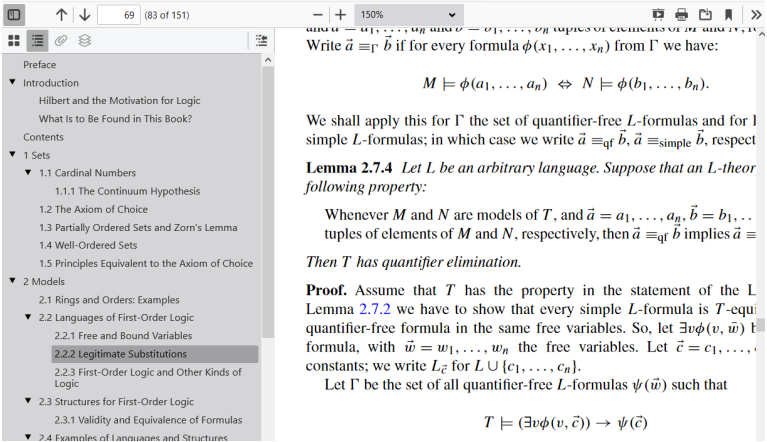
EE

Nullam a risus at arcu lobortis viverra vel volutpat diam.

2 FF

2.0.1 GG

Vincents 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.
```

\includegraphics

```
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

- 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}
```

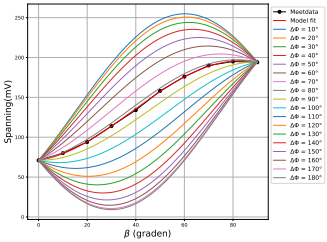
- 90% linewidth

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

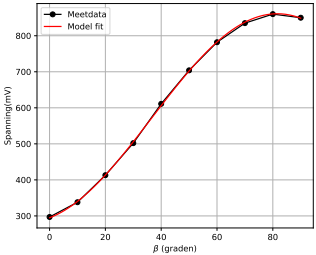
- Width maximally 90% linewidth and height maximally 5 cm

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

Formulas

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

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

Formulas

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

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

```
\usepackage{amsmath,amssymb}
\usepackage{commath,mathtools}
```

Formulas: The basics

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

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`$ x^22 $`: x^22

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

Formulas: Symbols

Formula	Code	Formula	Code
$x_1, \ldots, x_n$	$ $	$5 \cdot 6$	$ $
α, β, γ	$ $	A, B, Γ	$ $
ϵ, ε	$ $	$\mathcal{P}$	$ $
ϕ, φ	$ $	$\mathbb{P}$	$ $

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α, β, γ	`$ \alpha,\beta,\gamma $`	A, B, Γ	`$ A,B,\Gamma $`
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$x_1, \ldots, 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}
```

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

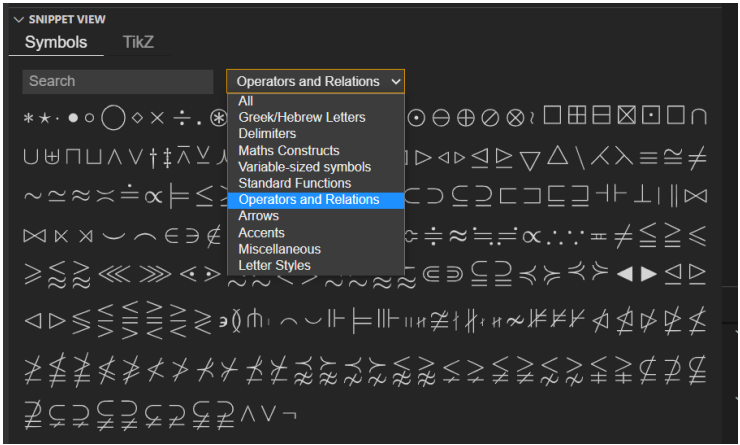
$$\lim_{x \to 0} \frac{\sin(x)}{x} = 1$$

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

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}
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\end{equation}
```

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

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

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

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Align

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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

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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*}
```

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

```
\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
```

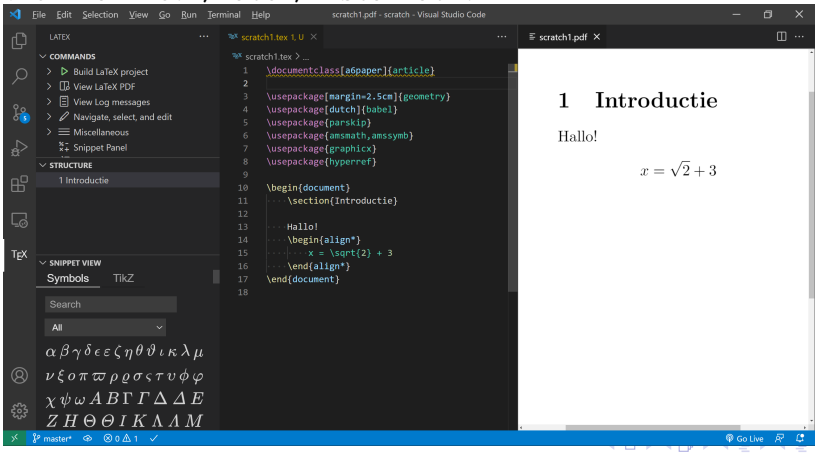
$\mathrm{CO_2 + C \longrightarrow 2\,CO}$
$\mathrm{CO_2 + C \longrightarrow 2\,CO}$
$\mathrm{CH_4 + 2\left(O_2 + \frac{79}{21}\,N_2\right)}$

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



Sometimes you might need to compile multiple times.

Το τέλος

Questions?

Stuck? Mail me at
vincent.kuhlmann@hotmail.com

The slides can be found on
https://vkuhlmann.com/latex