A quick guide to LaTeX

TEMPLATES

University Templates: DTU, AAU, KU

B, *I*, U

- Use `\textbf` for **boldfaced text**.
- Use `\textit` for *italic text*.
- Use `\underline` for underlined text.

SECTIONS AND NEW LINES

- Divide your document into sections using `\section{}`, `\subsection{}` and `\subsubsection{}`.
- Show table of contents with `\tableofcontents`.
- LaTeX ignores extra spaces and new lines.
- Use `\par` or two line breaks to create a new paragraph.
- Use `\\` to create a new line (but not create a new paragraph).
- Use `\noindent` to prevent a paragraph from indenting.

IMAGES

Upload images to Overleaf and use `\begin{figure}...` :

```
\begin{figure}[h]
\centering
\includegraphics[width=0.7\linewidth]{image.png}
\caption{How to upload an image}
\end{figure}
```

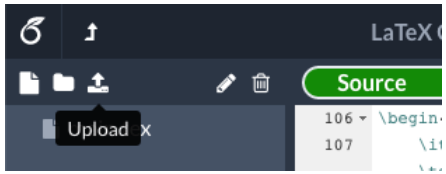

Figure 1: How to upload an image

MATH

Writing math

- Use `$` for writing **inline** math.
  e.g. `$ \sum_{n=1}^{\infty} \frac{1}{n} \sin(n) $` yields $\sum_{n=1}^{\infty} \frac{1}{n} \sin(n)$.
- Use `\[` and `\]` for writing **unnumbered display** math.
  e.g. `\[ \sum_{n=1}^{\infty} \frac{1}{n} \sin(n) \]` yields

$$\sum_{n=1}^{\infty} \frac{1}{n} \sin(n)$$

- Use `\begin{gather}` and `\end{gather}` for writing **numbered display** math. **Note:** `gather` requires the ams-packages. See Packages section on next page.
  e.g. `\begin{gather} \cos(0) = 1 \end{gather}` yields

$$\cos(0) = 1 \tag{1}$$

Elementary functions

description	*command*	*output*
natural log	`\ln(x)`	$\ln(x)$
logarithms	`\log_{a}b`	$\log_a b$
exponential function	`e^x=\exp(x)`	$e^x = \exp(x)$
sine	`\sin`	$\sin$
cosine	`\cos`	$\cos$
tangent	`\tan`	$\tan$
cotangent	`\cot`	$\cot$
secant	`\sec`	$\sec$
cosecant	`\csc`	$\csc$
inverse sine	`\arcsin`	$\arcsin$
inverse cosine	`\arccos`	$\arccos$
inverse tangent	`\arctan`	$\arctan$

Basic symbols

description	*command*	*output*
multiplication (dot)	`\cdot`	$\cdot$
multiplication (times)	`\times`	$\times$
fraction	`\frac{a}{b}`	$\frac{a}{b}$
square root	`\sqrt{x}`	$\sqrt{x}$
exponentiation	`a^b`	a^b
subscript	`a_b`	a_b
plus/minus	`\pm`	$\pm$
not equal	`\ne`	$\neq$
less than or equal to	`\le`	$\leq$
greater than or equal to	`\ge`	$\geq$
approximately equal to	`\approx`	$\approx$
infinity	`\infty`	∞
dots	`1,2,3,\ldots`	$1, 2, 3, \ldots$
dots	`1+2+3+\cdots`	$1 + 2 + 3 + \cdots$
nth root	`\sqrt[n]{x}`	$\sqrt[n]{x}$
absolute value	`|x|`	$\|x\|$
number sets	`\mathbb{R}`	$\mathbb{R}$

Calculus

description	*command*	*output*
derivative	`\frac{df}{dx}`	$\frac{df}{dx}$
derivative	`f'`	f'
partial derivative	`\frac{\partial f}{\partial x}`	$\frac{\partial f}{\partial x}$
integral	`\int_a^b \, dx`	$\int_a^b dx$
limits	`\lim_{x\to \infty}`	$\lim_{x\to\infty}$
summation	`\sum_{n=1}^{\infty}a_n`	$\sum_{n=1}^{\infty} a_n$
product	`\prod_{n=1}^{\infty}a_n`	$\prod_{n=1}^{\infty} a_n$

Delimiters (parentheses)

description	*command*	*output*
parentheses	`(x)`	(x)
brackets	`[x]`	[x]
curly braces	`\{x\}`	{x}

`\right` and `\left` makes the delimiters large. For example `\left\{\sin\left(\frac{1}{n}\right)\right\}_{n}^{\infty}` produces $\left\{\sin\left(\frac{1}{n}\right)\right\}_{n}^{\infty}$.

Curly braces are non-printing characters that are used to gather text that has more than one character. Observe the differences between the four expressions `x^2`, `x^{2}`, `x^2t`, `x^{2t}` when typeset: x^2, x^2, x^2t, x^{2t}.

Functions

description	*command*	*output*
maps to	`\to`	$\to$
composition	`\circ`	$\circ$

piecewise function	`|x|=`
	`\begin{cases}`
	`x & x\ge 0\\`
	`-x & x<0`
	`\end{cases}`
		$\|x\| = \begin{cases} x & x \geq 0 \\ -x & x < 0 \end{cases}$

Logic

description	*command*	*output*
not	`\neg`	$\neg$
and	`\land`	$\land$
or	`\lor`	$\lor$
if...then	`\to`	$\to$
if and only if	`\leftrightarrow`	$\leftrightarrow$
logical equivalence	`\equiv`	$\equiv$
therefore	`\therefore`	$\therefore$
there exists	`\exists`	$\exists$
for all	`\forall`	$\forall$
implies	`\Rightarrow`	$\Rightarrow$
equivalent	`\Leftrightarrow`	$\Leftrightarrow$

Greek and Hebrew letters

command	*output*	*command*	*output*
`\alpha`	α	`\beta`	β
`\gamma`	γ	`\Gamma`	Γ
`\delta`	δ	`\Delta`	Δ
`\epsilon`	ϵ	`\varepsilon`	ε
`\pi`	π	`\Pi`	Π
`\tau`	τ	`\zeta`	ζ
`\theta`	θ	`\Theta`	Θ
`\chi`	χ	`\upsilon`	υ
`\xi`	ξ	`\iota`	ι
`\omega`	ω	`\Omega`	Ω
`\eta`	η	`\rho`	ρ
`\kappa`	κ	`\Upsilon`	Υ
`\lambda`	λ	`\Lambda`	Λ
`\mu`	μ	`\nu`	ν
`\sigma`	σ	`\Sigma`	Σ
`\phi`	ϕ	`\Phi`	Φ
`\varphi`	φ	`\Xi`	Ξ
`\psi`	ψ	`\Psi`	Ψ
`\aleph`	$\aleph$	`\daleth`	$\daleth$
`\beth`	$\beth$	`\gimel`	$\gimel$

Geometry

description	*command*	*output*
angle	`\angle ABC`	$\angle ABC$
degree	`90^{\circ}`	90°
triangle	`\triangle ABC`	$\triangle ABC$
segment	`\overline{AB}`	$\overline{AB}$

Set theory

description	*command*	*output*
set brackets	`\{1,2,3\}`	$\{1,2,3\}$
element of	`\in`	$\in$
not an element of	`\not\in`	$\notin$
subset of	`\subset`	$\subset$
subset of	`\subseteq`	$\subseteq$
not a subset of	`\not\subset`	$\not\subset$
contains	`\supset`	$\supset$
contains	`\supseteq`	$\supseteq$
union	`\cup`	$\cup$
intersection	`\cap`	$\cap$
big union	`\bigcup_{n=1}^{10}A_n`	$\bigcup_{n=1}^{10} A_n$
big intersection	`\bigcap_{n=1}^{10}A_n`	$\bigcap_{n=1}^{10} A_n$
empty set	`\emptyset`	$\emptyset$
power set	`\mathcal{P}`	$\mathcal{P}$
minimum	`\min`	$\min$
maximum	`\max`	$\max$
supremum	`\sup`	$\sup$
infimum	`\inf`	$\inf$
limit superior	`\limsup`	$\limsup$
limit inferior	`\liminf`	$\liminf$
closure	`\overline{A}`	$\overline{A}$

Linear algebra

description	*command*	*output*
vector	`\vec{v}`	$\vec{v}$
vector	`\mathbf{v}`	$\mathbf{v}$
norm	`| \vec{v} |`	$\|\vec{v}\|$
matrix	`\left[ \begin{array}{ccc} 1 & 2 & 3 \\ 4 & 5 & 6\\ 7 & 8 & 0 \end{array} \right]`	$\left[\begin{array}{ccc} 1 & 2 & 3 \\ 4 & 5 & 6\\ 7 & 8 & 0 \end{array}\right]$
determinant	`\left| \begin{array}{ccc} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 0 \end{array} \right|`	$\left\|\begin{array}{ccc} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 0 \end{array}\right\|$
determinant	`\det(A)`	$\det(A)$
trace	`\operatorname{tr}(A)`	$\operatorname{tr}(A)$
dimension	`\dim(V)`	$\dim(V)$

Number theory

description	*command*	*output*
mod	`\mod`	$\mod$
greatest common divisor	`\gcd`	$\gcd$
ceiling	`\lceil x \rceil`	$\lceil x \rceil$
floor	`\lfloor x \rfloor`	$\lfloor x \rfloor$

LISTS

You can produce ordered and unordered lists.

description	*command*	*output*
unordered list	`\begin{itemize}` `\item Thing 1` `\item Thing 2` `\end{itemize}`	• Thing 1 • Thing 2
ordered list	`\begin{enumerate}` `\item Thing 1` `\item Thing 2` `\end{enumerate}`	1. Thing 1 2. Thing 2

TABLES

1. Use the booktabs package.
2. Make your table using tablesgenerator.com and choose the booktabs table style.

BIBLIOGRAPHY

1. Create bibliography.bib file.
2. Use `csquotes` and `biblatex` packages:

```
\usepackage{csquotes}
\usepackage[backend=biber]{biblatex}
\bibliography{bibliography.bib}
```

3. Cite source with `\cite{}` or `\footcite{}`.
4. Print bibliography with `\printbibliography`.

REFERENCES

- Label numbered sections, tables, figures and equations for later reference. For example

```
\begin{gather}
    \label{eq:N2} \vec{F} = m \vec{a}
\end{gather}
```

$$\vec{F} = m\vec{a} \tag{2}$$

- Reference them using `\ref{}`. For example:
`see Equation (\ref{eq:N2})` yields see Equation (2).

SYMBOLS (IN TEXT MODE)

The following symbols do **not** have to be surrounded by dollar signs: `\$` = $, `\%` = %, `\&` = &, `\#` = #, `\textbackslash` = \

PACKAGES

```
\usepackage{amssymb,amsmath,amsthm,amsfonts} % Math.
\usepackage[pdftex]{graphicx} % For pictures.
\usepackage[danish]{babel} % For Danish writing.
\usepackage{hyperref} % Format links for pdf.
\usepackage{calc} % Reset counter after title page.
\usepackage[a4paper, margin=4cm]{geometry} % margins.
```

- physics: For easy typesetting of physics equations.
- Either mhchem or chemfig: For chemical formulas.

CREDIT

This guide was adapted from the Quick guide to LaTeX originally created by Dave Richeson, Dickinson College, http://divisbyzero.com/.