



Introduction to Scientific Working

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Keywords

- acknowledgement
- awards
- beamer
- bibliography
- CORE ranking
- DBLP
- conference
- editorial board
- generative AI
- Google Scholar
- h-index
- impact factor
- journal
- LaTeX
- LIPICs
- LNCS
- open access
- plagiarism
- presentation
- program committee
- rebuttal
- review
- submission
- TikZ
- workshop
- ...

Types of Scientific Works

- ▶ seminar report
- ▶ workshop paper
- ▶ bachelor thesis
- ▶ conference paper
- ▶ master thesis
- ▶ journal article
- ▶ PhD thesis
- ▶ book chapter
- ▶ habilitation thesis
- ▶ book

Outline

1. LaTeX
2. Journals
3. TikZ

Exemplary Bachelor Theses

- ▶ Number Link Benjamin Rupprechter 2009
- ▶ Kurodoko Johannes Koch 2020
- ▶ Five Cells Diana Gründlinger 2023

Common Ingredients

- ▶ appendices
- ▶ formulas
- ▶ screen shots
- ▶ bibliography
- ▶ hyper links
- ▶ table of contents
- ▶ chapters/sections
- ▶ lists
- ▶ tables
- ▶ figures
- ▶ plots
- ▶ footnotes
- ▶ program code

► split environment

```
\begin{equation} \begin{split}
H_c &= \frac{1}{2n} \sum_{l=0}^n (-1)^l (n-l)^{p-2} \\
&\sum_{l_1 + \dots + l_p = l} \prod_{i=1}^p \binom{n_i}{l_i} \\
&\quad \cdot [(n-l) - (n_i - l_i)]^{n_i - l_i} \cdot \dots \\
&\Bigl[ (n-l)^2 - \sum_{j=1}^p (n_i - l_i)^2 \Bigr]
\end{split} \end{equation}
```

src

$$H_c = \frac{1}{2n} \sum_{l=0}^n (-1)^l (n-l)^{p-2} \sum_{l_1 + \dots + l_p = l} \prod_{i=1}^p \binom{n_i}{l_i} \cdot [(n-l) - (n_i - l_i)]^{n_i - l_i} \cdot \left[(n-l)^2 - \sum_{j=1}^p (n_i - l_i)^2 \right] \quad (1)$$

► alignment

```
\begin{align*}
\alpha^* \beta & (\alpha \cup \beta)^* \\
& \subseteq \beta^+ \overbrace{\alpha^* (\alpha \cup \beta)^*}^{m-1} \\
& \tag{\$ \alpha^* \beta^+ \subseteq \beta^+ \alpha^* \$} \\
& \subseteq \beta^+ \beta^* \alpha^* \\
& \tag{induction hypothesis} \\
& \subseteq \beta^* \alpha^*
\end{align*}
```

src

$$\begin{aligned} \alpha^* \beta (\alpha \cup \beta)^* &\subseteq \beta^+ \overbrace{\alpha^* (\alpha \cup \beta)^*}^{m-1} && (\alpha^* \beta^+ \subseteq \beta^+ \alpha^*) \\ &\subseteq \beta^+ \beta^* \alpha^* && \text{(induction hypothesis)} \\ &\subseteq \beta^* \alpha^* \end{aligned}$$

► cases

For ordinals α and β their sum $\alpha + \beta$ is defined as follows:

```
\begin{align*}
\alpha + \beta & \text{,=,} \begin{cases} \alpha & \text{if } \beta = 0 \\ (\alpha + \gamma) + 1 & \text{if } \beta = \gamma + 1 \\ \sup\{\alpha + \xi \mid \xi < \beta\} & \text{if } \beta \text{ is a limit ordinal} \end{cases}
\end{align*}
```

src

For ordinals α and β their sum $\alpha + \beta$ is defined as follows:

$$\alpha + \beta = \begin{cases} \alpha & \text{if } \beta = 0 \\ (\alpha + \gamma) + 1 & \text{if } \beta = \gamma + 1 \\ \sup\{\alpha + \xi \mid \xi < \beta\} & \text{if } \beta \text{ is a limit ordinal} \end{cases}$$

Bibliography

The books $\text{\cite{SK21,SK23}}$ are great for study.

```
\begin{thebibliography}{1}
\bibitem{SK21}
Stefan Kottwitz, \emph{\LaTeX\ Beginner's Guide}, 2nd edition,
Packt Publishing, 2021.
\bibitem{SK23}
Stefan Kottwitz, \emph{\LaTeX\ Graphics with TikZ}, 1st edition,
Packt Publishing, 2023.
\end{thebibliography}
```

src

- $\text{\begin{thebibliography}[widest label]}$
- $\text{\cite{keys}}$
- $\text{\bibitem[/label]{key}}$

BibTeX

- ▶ separate database file containing references: `filename.bib`
- ▶ `\bibliographystyle{style}` and `\bibliography{filename}` in main document
- ▶ common styles: `plain` `unsrt` `alpha` `abbrv`
- ▶ `\usepackage{natbib}` provides additional styles: `plainnat` `unsrtnat` `abbrvnat`
- ▶ BibTeX entry types: `book` `article` `inproceedings` `phdthesis` `techreport` ...

```
@book{SK23,  
  author   = "Stefan Kottwitz",  
  title    = "\LaTeX\ Graphics with {TikZ}",  
  edition  = "first",  
  publisher = "Packt Publishing",  
  year     = 2023  
}
```

- ▶ required fields: `author` or `editor` `title` `publisher` `year`
- ▶ optional fields: `volume` or `number` `series` `address` `edition` `month` `note`

```
@inproceedings{KM19,  
  author   = "Christina Kohl and Aart Middeldorp",  
  title    = "Composing Proof Terms",  
  booktitle = "Proc.\ 27th International Conference on Automated Deduction",  
  series   = "Lecture Notes in Artificial Intelligence",  
  volume   = 11716,  
  pages    = "337--353",  
  publisher = "Springer",  
  year     = 2019,  
  doi      = "10.1007/978-3-030-29436-6_20"  
}
```

latex src bib file

- ▶ required fields: `author` `title` `booktitle` `year`
- ▶ optional fields: `editor` `volume` or `number` `series` `pages` `organization`
`address` `publisher` `month` `note`

Outline

1. LaTeX
2. Journals
3. TikZ

- ▶ editorial board
- ▶ deadlines
- ▶ reviewing process
- ▶ publication
- ▶ impact factor
- ▶ open access

Some Computer Science Journals

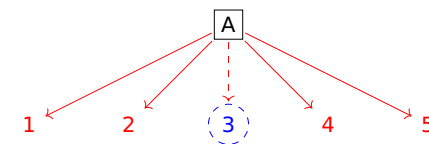


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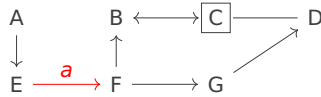
Trees

```
\node [draw, black, rectangle] {A} [red, ->]
  child { node {1} }
  child { node {2} }
  child [dashed] { node [draw, blue, circle] {3} }
  child { node {4} }
  child { node {5} };
```



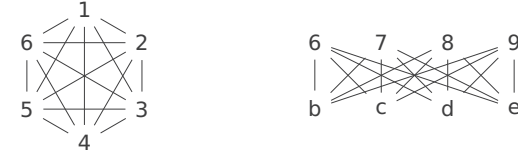
Graphs

```
\usetikzlibrary{graphs,quotes}
\graph [grow right = 15mm] {
  A -!- B <-> C [draw] -- D,
  E -> [red,"$a$"] F -> {B, G},
  G -> D,
  A -> E };
```



src

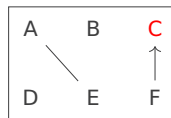
```
\usetikzlibrary{graphs.standard}
\tikz \graph { subgraph K_n [n=6, clockwise] };
\tikz \graph [branch right, grow down]
  { subgraph K_nm [V = {6,...,9}, W = {b,...,e}] };
```



src

Matrices

```
\usetikzlibrary{matrix}
\matrix (m) [matrix of nodes, draw, column sep = 5mm, row sep = 6mm] {
  A & B & |[red] (c)| C \\
  D & E & |(f)| F \\
};
\draw (m-1-1) edge (m-2-2);
      (f) edge[->] (c);
```



src

```
\usetikzlibrary{matrix}
\matrix [matrix of math nodes, left delimiter=(, right delimiter=\)] {
  a_8 & a_1 & a_6 \\
  a_3 & a_5 & a_7 \\
  a_4 & a_9 & a_2 \\
};
```

$$\begin{pmatrix} a_8 & a_1 & a_6 \\ a_3 & a_5 & a_7 \\ a_4 & a_9 & a_2 \end{pmatrix}$$

src