



Introduction to Scientific Working

Aart Middeldorp

Outline

- 1. LaTeX**
- 2. Journals**
- 3. TikZ**

Keywords

acknowledgement

awards

beamer

bibliography

CORE ranking

DBLP

conference

editorial board

generative AI

Google Scholar

h-index

impact factor

journal

L^AT_EX

LIPICs

LNCS

open access

plagiarism

presentation

program committee

rebuttal

review

submission

TikZ

workshop

...

Types of Scientific Works

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

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 | |

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| ▶ 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 \\ &\quad \Bigl[ (n-l)^2 - \sum_{j=1}^p (n_i-l_i)^2 \Bigl] \\ \end{split} \end{equation}
```

► split environment

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\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} \\ &\quad \cdot \left[ (n-l)^2 - \sum_{j=1}^p (n_j - l_j)^2 \right] \end{split} \end{equation}
```

src

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

► 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*}
```

► alignment

```
\begin{align*}
\alpha^* \beta (\alpha \cup \beta)^*
&\subseteq, \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 \quad , = \quad , \quad \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*}
```

► cases

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```
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\alpha + \beta \, = \, \begin{cases}
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\end{cases}
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```

src

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

Bibliography

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

```
\begin{thebibliography}{1}
```

```
\bibitem{SK21}
```

Stefan Kottwitz, `\emph{\LaTeX\ Beginner's Guide}`, 2nd edition,
Packt Publishing, 2021.

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\end{thebibliography}
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src

► `\begin{thebibliography}[widest label]`

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```
\end{thebibliography}
```

[src](#)

- ▶ `\begin{thebibliography}[widest label]`
- ▶ `\cite{keys}`
- ▶ `\bibitem[label]{key}`

BibTeX

- ▶ separate database file containing references: *filename.bib*

BibTeX

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- ▶ `\bibliographystyle{style}` and `\bibliography{filename}` in main document

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- ▶ 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  
}
```

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► required fields: author or editor title publisher year

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- ▶ 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"  
}
```

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[latex src](#)[bib file](#)

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Outline

1. LaTeX

2. Journals

3. TikZ

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

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Some Computer Science Journals

CACM

CSUR

FGCS

JACM

I&C

IOTJ

IPL

JAIR

JAR

JFP

JKM

JMLR

JSC

LMCS

NMI

RAS

TCS

TOCL

TODS

TPLP

...

Some Computer Science Journals

CACM

CSUR

FGCS

JACM

I&C

IOTJ

IPL

JAIR

JAR

JFP

JKM

JMLR

JSC

LMCS

NMI

RAS

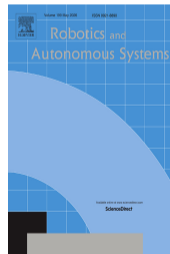
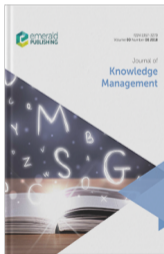
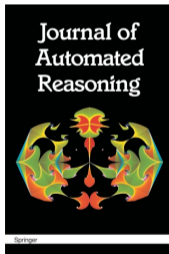
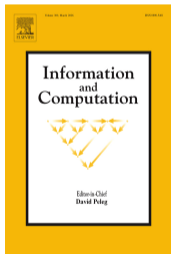
TCS

TOCL

TODS

TPLP

...



Outline

1. LaTeX

2. Journals

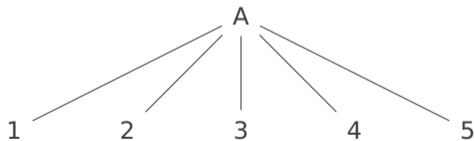
3. TikZ

Trees

```
\node {A}  
  child { node {1} }  
  child { node {2} }  
  child { node {3} }  
  child { node {4} }  
  child { node {5} };
```

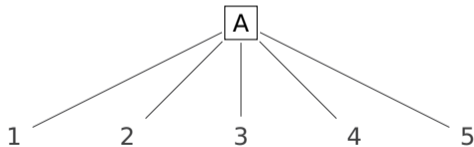
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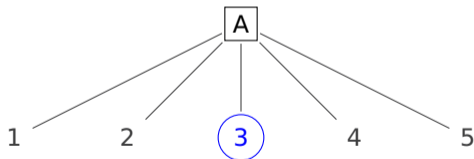
Trees

```
\node [draw, black, rectangle] {A}  
  child { node {1} }  
  child { node {2} }  
  child { node {3} }  
  child { node {4} }  
  child { node {5} };
```



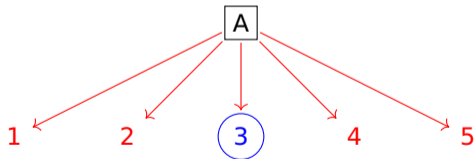
Trees

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



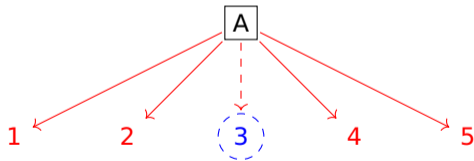
Trees

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



Trees

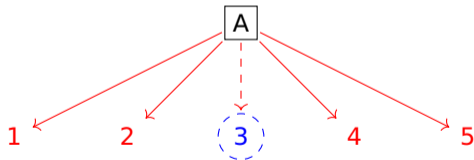
```
\node [draw, black, rectangle] {A} [red, ->]
  child { node {1} }
  child { node {2} }
  child [dashed] { node [draw, blue, circle] {3} }
  child { node {4} }
  child { node {5} };
```



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} };
```

src

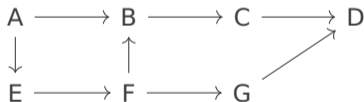


Graphs

```
\usetikzlibrary{graphs}  
\graph [grow right = 15mm] {  
  A -> B -> C -> D,  
  E -> F -> {B, G},  
  G -> D,  
  A -> E };
```

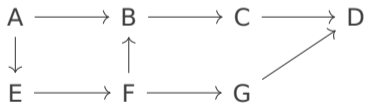
Graphs

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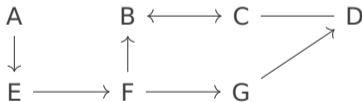
Graphs

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



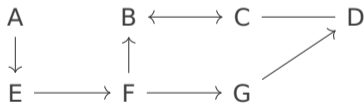
Graphs

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  G -> D,  
  A -> E };
```



Graphs

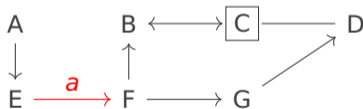
```
\usetikzlibrary{graphs,quotes}  
\graph [grow right = 15mm] {  
  A -!- B <-> C [draw] -- D,  
  E -> [red,"$a$"] F -> {B, G},  
  G -> D,  
  A -> E };
```



Graphs

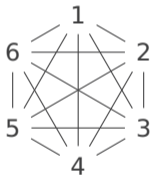
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src

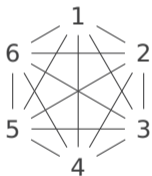


```
\usetikzlibrary{graphs.standard}  
\tikz \graph { subgraph K_n [n=6, clockwise] };
```

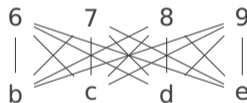
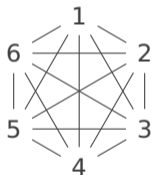
```
\usetikzlibrary{graphs.standard}  
\tikz \graph { subgraph K_n [n=6, clockwise] };
```



```
\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](#)

```
\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

```
\node [matrix, draw] {  
  \node{A}; & \node{B}; & \node{C}; \\  
  \node{D}; & \node{E}; & \node{F}; \\  
};
```

Matrices

```
\node [matrix, draw] {  
  \node{A}; & \node{B}; & \node{C}; \\  
  \node{D}; & \node{E}; & \node{F}; \\  
};
```

A	B	C
D	E	F

Matrices

```
\usetikzlibrary{matrix}  
\matrix [matrix of nodes, draw] {  
  A & B & C \\  
  D & E & F \\  
};
```

A	B	C
D	E	F

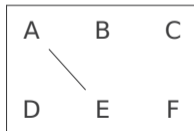
Matrices

```
\usetikzlibrary{matrix}
\matrix [matrix of nodes, draw, column sep = 5mm, row sep = 6mm] {
  A & B & C \\
  D & E & F \\
};
```

A	B	C
D	E	F

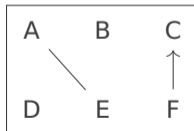
Matrices

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



Matrices

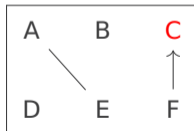
```
\usetikzlibrary{matrix}
\matrix (m) [matrix of nodes, draw, column sep = 5mm, row sep = 6mm] {
  A & B & |(c)| C \\
  D & E & |(f)| F \\
};
\draw (m-1-1) edge (m-2-2)
      (f) edge[->] (c);
```



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 \\
};
```

```
\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 \\
};
```

src

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