



# Introduction to Scientific Working

**Aart Middeldorp**

# Outline

- 1. TikZ**
- 2. Journals**
- 3. LaTeX**
- 4. DOI and ORCID**
- 5. Homework**

## Keywords

acknowledgement

awards

beamer

bibliography

CORE ranking

DBLP

conference

editorial board

generative AI

Google Scholar

h-index

impact factor

journal

L<sup>A</sup>T<sub>E</sub>X

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

# Outline

## 1. TikZ

## 2. Journals

## 3. LaTeX

## 4. DOI and ORCID

## 5. Homework

```
\usetikzlibrary{scopes}

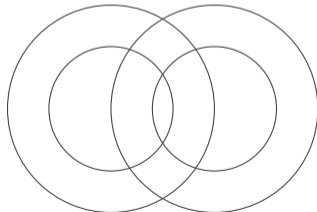
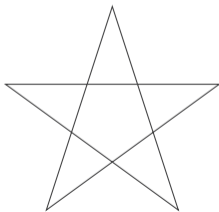
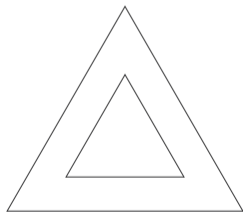
\draw (90:2) -- (210:2) -- (330:2) -- cycle
      (90:1) -- (330:1) -- (210:1) -- cycle;

{ [shift={(5cm,3.5mm)}, scale=1.65]
  \draw (90:1) -- (234:1) -- (18:1) -- (162:1) -- (306:1) -- cycle; }

{ [shift={(11cm,5mm)}, scale=0.76]
  \draw (-1,0) circle (1.2) (-1,0) circle (2);
  \draw (1,0) circle (1.2) (1,0) circle (2); }
```

## Paths and Filling

```
\usetikzlibrary{scopes}
\draw (90:2) -- (210:2) -- (330:2) -- cycle
      (90:1) -- (330:1) -- (210:1) -- cycle;
{ [shift={(5cm,3.5mm)}, scale=1.65]
  \draw (90:1) -- (234:1) -- (18:1) -- (162:1) -- (306:1) -- cycle; }
{ [shift={(11cm,5mm)}, scale=0.76]
  \draw (-1,0) circle (1.2) (-1,0) circle (2);
  \draw (1,0) circle (1.2) (1,0) circle (2); }
```

[src](#)

## Path Interior: Nonzero Rule

to determine whether point is outside or inside

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- ▶ set counter to zero
- ▶ each time ray crosses path

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- ▶ set counter to zero
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  - ▶ increment counter if path goes from left to right

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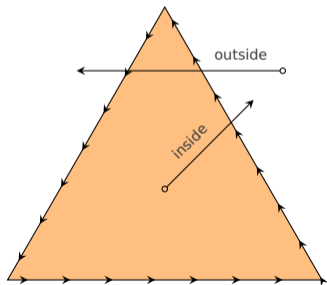
## Path Interior: Nonzero Rule

to determine whether point is outside or inside:

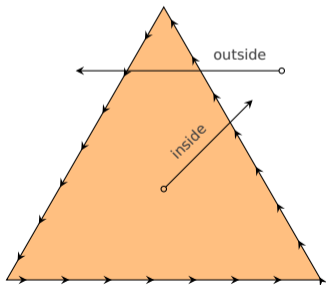
- ▶ consider ray from point toward infinity in any direction
- ▶ set counter to zero
- ▶ each time ray crosses path
  - ▶ increment counter if path goes from left to right
  - ▶ decrement counter if path goes from right to left
- ▶ point is outside (inside) if counter is zero (nonzero)

```
\filldraw[orange!50] (90:2) -- (210:2) -- (330:2) -- cycle;
```

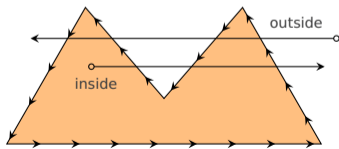
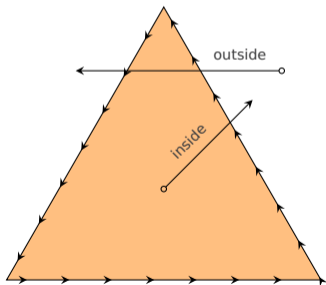
```
\filldraw[orange!50] (90:2) -- (210:2) -- (330:2) -- cycle;
```



```
\filldraw[orange!50] (90:2) -- (210:2) -- (330:2) -- cycle;  
\filldraw[orange!50] (150:1) -- (210:2) -- (330:2)  
-- (30:1) -- (0,-0.5) -- cycle;
```



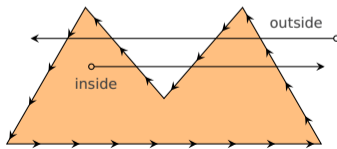
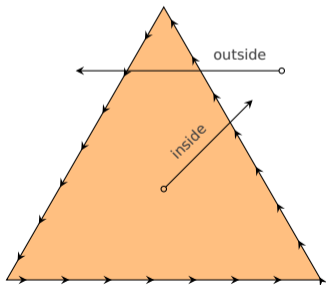
```
\filldraw[orange!50] (90:2) -- (210:2) -- (330:2) -- cycle;  
\filldraw[orange!50] (150:1) -- (210:2) -- (330:2)  
-- (30:1) -- (0,-0.5) -- cycle;
```



```

\filldraw[orange!50] (90:2) -- (210:2) -- (330:2) -- cycle;
\filldraw[orange!50] (150:1) -- (210:2) -- (330:2)
                    -- (30:1) -- (0,-0.5) -- cycle;
\filldraw[orange!50] (90:2) -- (210:2) -- (330:2) -- cycle
                    (90:1) -- (210:1) -- (330:1) -- cycle;

```

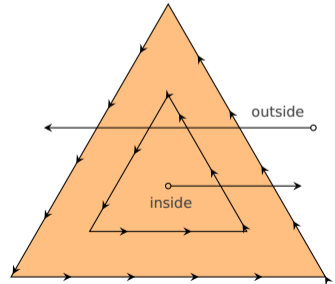
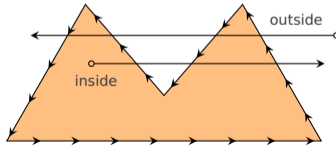
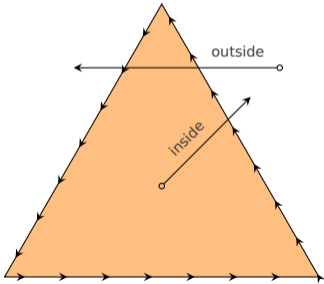


```

\filldraw[orange!50] (90:2) -- (210:2) -- (330:2) -- cycle;
\filldraw[orange!50] (150:1) -- (210:2) -- (330:2)
                    -- (30:1) -- (0,-0.5) -- cycle;
\filldraw[orange!50] (90:2) -- (210:2) -- (330:2) -- cycle
                    (90:1) -- (210:1) -- (330:1) -- cycle;

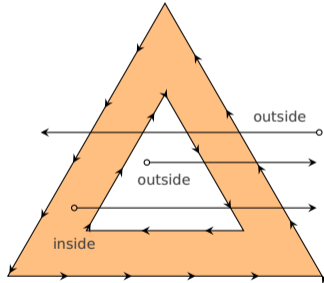
```

src



```
\filldraw[orange!50] (90:2) -- (210:2) -- (330:2) -- cycle
(90:1) -- (330:1) -- (210:1) -- cycle;
```

```
\filldraw[orange!50] (90:2) -- (210:2) -- (330:2) -- cycle
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```



## Path Interior: Nonzero Rule

to determine whether point is outside or inside:

- ▶ consider ray from point toward infinity in any direction
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- ▶ point is outside (inside) if counter is zero (nonzero)

## Path Interior: Even Odd Rule

## Path Interior: Nonzero Rule

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## Path Interior: Even Odd Rule

to determine whether point is outside or inside:

- ▶ count how often ray crosses path

## Path Interior: Nonzero Rule

to determine whether point is outside or inside:

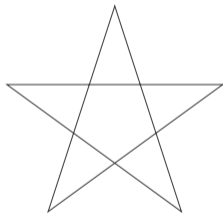
- ▶ consider ray from point toward infinity in any direction
- ▶ set counter to zero
- ▶ each time ray crosses path
  - ▶ increment counter if path goes from left to right
  - ▶ decrement counter if path goes from right to left
- ▶ point is outside (inside) if counter is zero (nonzero)

## Path Interior: Even Odd Rule

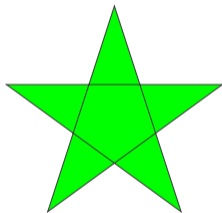
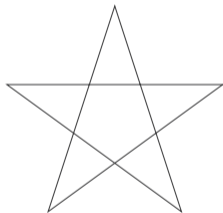
to determine whether point is outside or inside:

- ▶ count how often ray crosses path
- ▶ point is outside (inside) if count is even (odd)

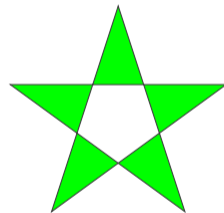
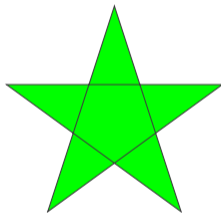
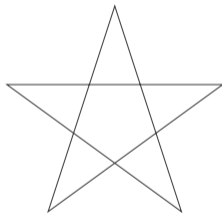
```
\draw (90:1) -- (234:1) -- (18:1) -- (162:1) -- (306:1) -- cycle;
```



```
\draw          (90:1) -- (234:1) -- (18:1) -- (162:1) -- (306:1) -- cycle;  
\draw[fill=green] (90:1) -- (234:1) -- (18:1) -- (162:1) -- (306:1) -- cycle;
```



```
\draw      (90:1) -- (234:1) -- (18:1) -- (162:1) -- (306:1) -- cycle;  
\draw[fill=green] (90:1) -- (234:1) -- (18:1) -- (162:1) -- (306:1) -- cycle;  
\draw[fill=green, even odd rule]      (90:1) -- (234:1) -- (18:1) -- (162:1) -- (306:1) -- cycle;
```

[src](#)

# Outline

1. TikZ

**2. Journals**

3. LaTeX

4. DOI and ORCID

5. Homework

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

# Some Computer Science Journals

CACM

CSUR

FGCS

JACM

I&C

IOTJ

IPL

JAIR

JAR

JFP

JKM

JMLR

JSC

LMCS

NMI

RAS

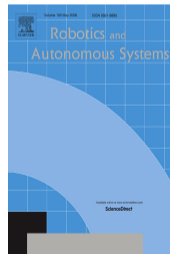
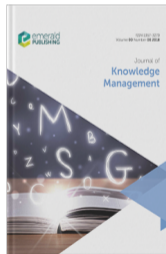
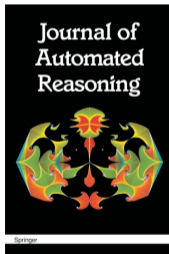
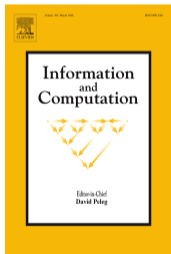
TCS

TOCL

TODS

TPLP

...



## Impact Factor

- ▶ bibliometric metric measuring average number of citations to recent articles

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- ▶ bibliometric metric measuring average number of citations to recent articles
- ▶ indicator of journal's prestige and impact

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- ▶ bibliometric metric measuring average number of citations to recent articles
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- ▶ calculated annually by Clarivate



$$\text{IF}(2025) = \frac{\text{citations in 2025 for articles published in 2024 and 2023}}{\text{number of articles published in 2024 and 2023}}$$

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- ▶ examples: Nature 48.5

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- ▶ examples: Nature 48.5      Science 45.8

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$$\text{IF}(2025) = \frac{\text{citations in 2025 for articles published in 2024 and 2023}}{\text{number of articles published in 2024 and 2023}}$$

- ▶ examples: Nature 48.5    Science 45.8    CACM 12.2    TCS 1.0



## Open Access

- ▶ green OA



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  - ▶ self-archiving by authors is permitted



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- ▶ green OA
  - ▶ self-archiving by authors is permitted
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## Open Access

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  - ▶ publisher makes all articles and related content available for free



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  - ▶ article processing charge (APC) typically paid through institutional or project funding
- ▶ **diamond OA**



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  - ▶ gold OA without APC



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- ▶ diamond OA
  - ▶ gold OA without APC
- ▶ hybrid OA



# Outline

1. TikZ

2. Journals

**3. LaTeX**

Formulas

Bibliography

4. DOI and ORCID

5. Homework

## ► matrices

```
\begin{matrix}
a & b & c & d \\
e & f & g & h \\
i & j & k & l
\end{matrix}
```

## ► matrices

```
\begin{matrix}
a & b & c & d \\
e & f & g & h \\
i & j & k & l
\end{matrix}
```

$$\begin{matrix} a & b & c & d \\ e & f & g & h \\ i & j & k & l \end{matrix}$$

## ► matrices

```
\begin{pmatrix}
a & b & c & d \\
e & f & g & h \\
i & j & k & l
\end{pmatrix}
```

$$\begin{pmatrix} a & b & c & d \\ e & f & g & h \\ i & j & k & l \end{pmatrix}$$

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\begin{bmatrix}
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```

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## ► matrices

```
\begin{bmatrix}
a & b & c & d \\
e & \hdotsfor{3} \\
i & j & k & l
\end{bmatrix}
```

$$\begin{bmatrix} a & b & c & d \\ e & \dots & & \\ i & j & k & l \end{bmatrix}$$

## ► matrices

```
\begin{bmatrix}
a & b & c & d \\
e & \hdotsfor{3} \\
i & j & k & l
\end{bmatrix}
```

$$\begin{bmatrix} a & b & c & d \\ e & \dots & & \\ i & j & k & l \end{bmatrix}$$

► `Bmatrix` `vmatrix` `Vmatrix` produce different delimiters  $\{ \}$   $| |$   $|| |$

## ► matrices

```
\begin{bmatrix}
a & b & c & d \\
e & \hdotsfor{3} \\
i & j & k & l
\end{bmatrix}
```

$$\begin{bmatrix} a & b & c & d \\ e & \dots & & \\ i & j & k & l \end{bmatrix}$$

- `Bmatrix` `vmatrix` `Vmatrix` produce different delimiters  $\{ \}$   $| |$   $|| |$
- `smallmatrix` environment for use in text  $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$

## ▶ spacing

## ► spacing

abbreviation	command	example
	<i>(no space)</i>	[ ]
\,	\thinspace	[ ]
\:	\medspace	[ ]
\;	\thickspace	[ ]
	\quad	[ ]
	\qqquad	[ ]
\!	\negthinspace	[ ]
	\negmedspace	[ ]
	\negthickspace	[ ]

## ► spacing and dots

abbreviation	command	example	command	description
	<i>(no space)</i>	[ ]	<code>\dotsc</code>	dots with commas
<code>\,</code>	<code>\thinspace</code>	[ ]	<code>\dotsb</code>	dots with binary operators/relations
<code>\:</code>	<code>\medspace</code>	[ ]	<code>\dotsm</code>	multiplication dots
<code>\;</code>	<code>\thickspace</code>	[ ]	<code>\dotsi</code>	dots with integrals
	<code>\quad</code>	[ ]	<code>\dotso</code>	other dots
	<code>\qquad</code>	[ ]		
<code>\!</code>	<code>\negthinspace</code>	[ ]		
	<code>\negmedspace</code>	[ ]		
	<code>\negthickspace</code>	[ ]		

Consider the series  $A_1, A_2, \dots$ , the sum  $A_1 + A_2 + \dots$ ,  
the product  $A_1 A_2 \dots$ , and the infinite integral

```
\[  
\int_{A_1} \int_{A_2} \dots i  
\]
```

Consider the series  $A_1, A_2, \dots$ , the sum  $A_1 + A_2 + \dots$ ,  
the product  $A_1 A_2 \dots$ , and the infinite integral  
 $\int_{A_1} \int_{A_2} \dots$

src

Consider the series  $A_1, A_2, \dots$ , the sum  $A_1 + A_2 + \dots$ , the product  $A_1 A_2 \dots$ , and  
the infinite integral

$$\int_{A_1} \int_{A_2} \dots$$

► extensible arrows

A `\xleftarrow{n+\mu-1}` B `\xrightarrow[\gamma]{n^2+i-1}` C

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A `\xleftarrow{n+\mu-1}` B `\xrightarrow[\gamma]{n^2+i-1}` C

$$A \xleftarrow{n+\mu-1} B \xrightarrow[\gamma]{n^2+i-1} C$$

► extensible arrows and friends

```
A \xleftarrow{n+\mu-1} B \xrightarrow[\gamma]{n^2+i-1} C
```

```
\overset{*}{X} \quad \underset{\alpha}{Y} \quad \overunderset{*}{\alpha}{Z}
```

$$A \xleftarrow{n+\mu-1} B \xrightarrow[\gamma]{n^2+i-1} C$$

► extensible arrows and friends

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A \xleftarrow{n+\mu-1} B \xrightarrow[\gamma]{n^2+i-1} C
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\overset{*}{X} \quad \underset{\alpha}{Y} \quad \overunderset{*}{\alpha}{Z}
```

$$A \xleftarrow{n+\mu-1} B \xrightarrow[\gamma]{n^2+i-1} C \quad \overset{*}{X} \quad \underset{\alpha}{Y} \quad \overunderset{*}{\alpha}{Z}$$

► extensible arrows and friends

A  $\xleftarrow{n+\mu-1}$  B  $\xrightarrow[\gamma]{n^2+i-1}$  C

$\overset{*}{X}$   $\quad \underset{\alpha}{Y}$   $\quad \overunderset{*}{\alpha}{Z}$

$\sqrt{x}+\sqrt{y}+\sqrt{z}$   $\neq \sqrt{x}+\sqrt{\smash[b]{y}}+\sqrt{z}$

$$A \xleftarrow{n+\mu-1} B \xrightarrow[\gamma]{n^2+i-1} C \quad \overset{*}{X} \quad \underset{\alpha}{Y} \quad \overunderset{*}{\alpha}{Z}$$

► extensible arrows and friends

A  $\xleftarrow{n+\mu-1}$  B  $\xrightarrow[\gamma]{n^2+i-1}$  C

$\overset{*}{X}$   $\quad \underset{\alpha}{Y}$   $\quad \overunderset{*}{\alpha}{Z}$

$\sqrt{x} + \sqrt{y} + \sqrt{z}$   $\neq \sqrt{x} + \sqrt{\smash[b]{y}} + \sqrt{z}$

src

$$A \xleftarrow{n+\mu-1} B \xrightarrow[\gamma]{n^2+i-1} C \quad \overset{*}{X} \quad \underset{\alpha}{Y} \quad \overunderset{*}{\alpha}{Z} \quad \sqrt{x} + \sqrt{y} + \sqrt{z} \neq \sqrt{x} + \sqrt{y} + \sqrt{z}$$

`\left`

`\right`

---

$$(a)\left(\frac{b}{c}\right) \quad (a)\left(\frac{b}{c}\right)$$

► delimiters

`\left`    `\bigl`

`\right`    `\bigr`

---

$(a)\left(\frac{b}{c}\right)$      $(a)\bigl(\frac{b}{c}\bigr)$      $(a)\left(\frac{b}{c}\right)$

► delimiters

`\left`    `\bigl`    `\Bigl`

`\right`    `\bigr`    `\Bigr`

---

$(a)(\frac{b}{c})$      $(a)\left(\frac{b}{c}\right)$      $(a)\bigl(\frac{b}{c}\bigr)$      $(a)\Bigl(\frac{b}{c}\Bigr)$

► delimiters

<code>\left</code>	<code>\bigl</code>	<code>\Bigl</code>	<code>\biggl</code>
<code>\right</code>	<code>\bigr</code>	<code>\Bigr</code>	<code>\biggr</code>

---

$(a)(\frac{b}{c})$	$(a)\left(\frac{b}{c}\right)$	$(a)\left(\frac{b}{c}\right)$	$(a)\left(\frac{b}{c}\right)$	$(a)\left(\frac{b}{c}\right)$
--------------------	-------------------------------	-------------------------------	-------------------------------	-------------------------------

► delimiters

	<code>\left</code>	<code>\bigl</code>	<code>\Bigl</code>	<code>\biggl</code>	<code>\Biggl</code>
	<code>\right</code>	<code>\bigr</code>	<code>\Bigr</code>	<code>\biggr</code>	<code>\Biggr</code>
<hr/>					
$(a)(\frac{b}{c})$	$(a)\left(\frac{b}{c}\right)$	$(a)\bigl(\frac{b}{c}\bigr)$	$(a)\Bigl(\frac{b}{c}\Bigr)$	$(a)\biggl(\frac{b}{c}\biggr)$	$(a)\Biggl(\frac{b}{c}\Biggr)$

► delimiters

<code>\left</code>	<code>\bigl</code>	<code>\Bigl</code>	<code>\biggl</code>	<code>\Biggl</code>
<code>\right</code>	<code>\bigr</code>	<code>\Bigr</code>	<code>\biggr</code>	<code>\Biggr</code>
$(a)\left(\frac{b}{c}\right)$	$(a)\bigl(\frac{b}{c}\bigr)$	$(a)\Bigl(\frac{b}{c}\Bigr)$	$(a)\biggl(\frac{b}{c}\biggr)$	$(a)\Biggl(\frac{b}{c}\Biggr)$

```
\left[\sum_i a_i\left\lvert\sum_j x_{ij}\right\rvert^p\right]^{1/p}
\quad\text{versus}\quad
\biggl[\sum_i a_i\Bigl\lvert\sum_j x_{ij}\Bigr\rvert^p\biggr]^{1/p}
```

► delimiters

<code>\left</code>	<code>\bigl</code>	<code>\Bigl</code>	<code>\biggl</code>	<code>\Biggl</code>
<code>\right</code>	<code>\bigr</code>	<code>\Bigr</code>	<code>\biggr</code>	<code>\Biggr</code>
$(a)\left(\frac{b}{c}\right)$	$(a)\bigl(\frac{b}{c}\bigr)$	$(a)\Bigl(\frac{b}{c}\Bigr)$	$(a)\biggl(\frac{b}{c}\biggr)$	$(a)\Biggl(\frac{b}{c}\Biggr)$

```
\left[\sum_i a_i\left|\left|\sum_j x_{ij}\right|\right|^p\right]^{1/p}
\quad\text{versus}\quad
\biggl[\sum_i a_i\Bigl|\left|\sum_j x_{ij}\right|\Bigr|^p\biggr]^{1/p}
```

src

$$\left[\sum_i a_i \left|\sum_j x_{ij}\right|^p\right]^{1/p} \quad \text{versus} \quad \left[\sum_i a_i \Bigl|\sum_j x_{ij}\Bigr|^p\right]^{1/p}$$

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@article{EWZ08,  
  author = "J{\\"o}rg Endrullis and Johannes Waldmann and Hans Zantema",  
  title = "Matrix Interpretations for Proving Termination of Rewrite Systems",  
  journal = "Journal of Automated Reasoning",  
  volume = 40,  
  number = "2-3",  
  pages = "195--220",  
  year = 2008,  
  doi = "10.1007/s10817-007-9087-9"  
}
```

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@article{EWZ08,  
  author = "J{\\"o}rg Endrullis and Johannes Waldmann and Hans Zantema",  
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}
```

► required fields: author title journal year

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  pages = "195--220",  
  year = 2008,  
  doi = "10.1007/s10817-007-9087-9"  
}
```

- ▶ required fields: author title journal year
- ▶ optional fields: volume number pages month note

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@phdthesis{B65,  
  author    = "Bruno Buchberger",  
  title     = "Ein {A}lgorithmus zum {A}uffinden der {B}asisselemente des  
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  school    = "Universit{\\"a}t Innsbruck",  
  year      = 1965  
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► required fields: author title school year

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  year     = 1965  
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- ▶ required fields: author title school year
- ▶ optional fields: type address month note

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@techreport{MS91,  
  author      = "Aart Middeldorp and Mirna Star\v{c}evi\'{c}",  
  title       = "A Rewrite Approach to Polynomial Ideal Theory",  
  number      = "CS-R9160",  
  institution = "CWI, Amsterdam",  
  year        = 1991  
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  institution = "CWI, Amsterdam",  
  year        = 1991  
}
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- ▶ required fields: author title institution year
- ▶ optional fields: type number address month note

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  author = "Hubert Comon and Max Dauchet and R{\'e}mi Gilleron and  
           Christof L{\"o}ding and Florent Jacquemard and Denis Lugiez and  
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  title  = "Tree Automata Techniques and Applications",  
  url    = "http://tata.gforge.inria.fr/",  
  year   = 2008  
}
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@misc{Haskell,  
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  howpublished   = "\url{https://www.haskell.org/}",  
  note           = "Accessed: 2026-04-02"  
}
```

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@misc{TATA,  
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  note           = "Accessed: 2026-04-02"  
}
```

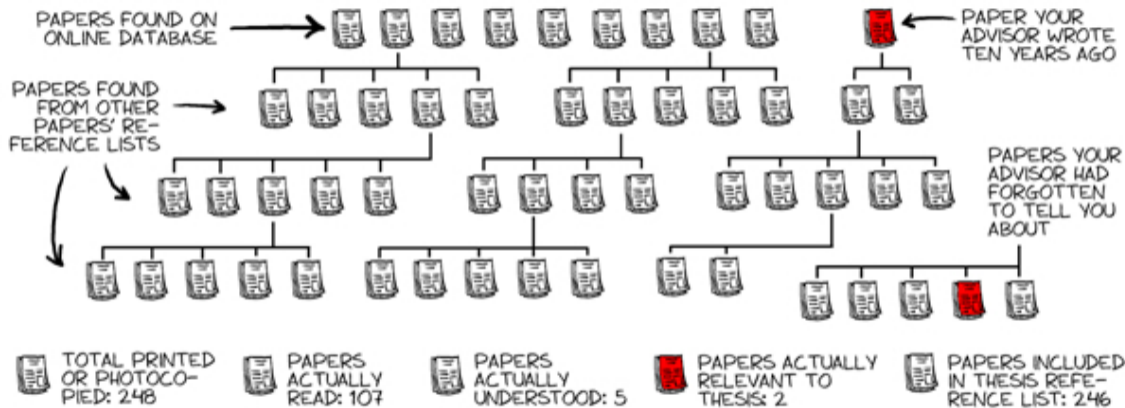
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bib file

# REFERENCES

MAKING SURE NO ONE HAS ALREADY WRITTEN YOUR THESIS

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# Outline

1. TikZ
2. Journals
3. LaTeX
- 4. DOI and ORCID**
5. Homework

- ▶ DOI is digital identifier of object to keep track of it



## Digital Object Identifier

- ▶ DOI is digital identifier of object to keep track of it
- ▶ `https://doi.org/doi`



## Digital Object Identifier

- ▶ DOI is digital identifier of object to keep track of it
- ▶ <https://doi.org/doi>
- ▶ papers      10.46298/lmcs-21(2:29)2025



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- ▶ projects         10.55776/I5943



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- ▶ projects        10.55776/I5943
- ▶ artifacts        10.5281/zenodo.13969852



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- ▶ projects        10.55776/I5943
- ▶ artifacts        10.5281/zenodo.13969852



## Open Researcher and Contributor ID

- ▶ ORCID is unique persistent identifier for researchers



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- ▶ DOI is digital identifier of object to keep track of it
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- ▶ projects         10.55776/I5943
- ▶ artifacts         10.5281/zenodo.13969852



## Open Researcher and Contributor ID

- ▶ ORCID is unique persistent identifier for researchers           0000-0001-7366-8464
- ▶ ORCID record connects researchers with activities
  - ▶ employment affiliations
  - ▶ research outputs
  - ▶ funding
  - ▶ ...



# Outline

1. TikZ
2. Journals
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4. DOI and ORCID
- 5. Homework**

## Homework Exercises for May 7

- ① Reproduce the DOI and ORCID logos shown on slide 27 using TikZ. ①
- ② Determine the 2024 or 2025 impact factors as well as the access models of the journals whose acronyms are given on slide 12. ①
- ③ Typeset the following symbols in  $\LaTeX$ : ①



- ④ What is CiteScore? How does it compare to IF? ①
- ⑤ Summarize the criticism raised at the OA model of the ACM Digital Library. ①