Introduction to Scientific Working

Aart Middeldorp

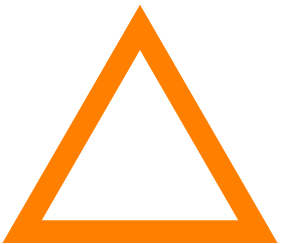
Outline

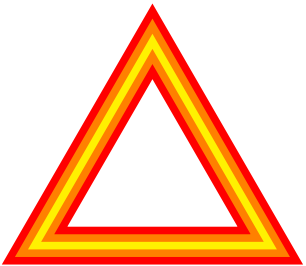
1. **TikZ**
2. **Intellectual Property**
3. **LaTeX**
4. **Scheduling and Grading**
5. **Homework**

Decorating Paths

```
\draw [orange, line width = 3mm,
  preaction = {draw, red, line width = 5mm},
  postaction = {draw, yellow, line width = 1mm}]
  (90:2) -- (210:2) -- (330:2) -- cycle;
```

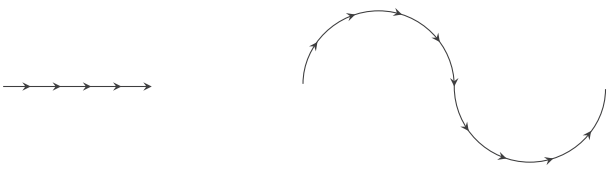
src





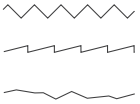
```
\usetikzlibrary{decorations.markings}
\draw [postaction = decorate,
  decoration = {markings, mark = between positions 0.2 and 1
  step 0.2 with {\arrow{stealth}}}]
      (0,0) -- (2,0);
\draw [postaction = decorate,
  decoration = {markings, mark = between positions 0.1 and 1
  step 0.1 with {\arrow{stealth}}}]
      (0,0) arc(180:0:1) arc(-180:0:1);
```

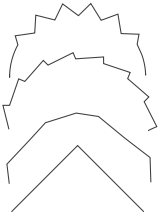
src



```
\usetikzlibrary{decorations.pathmorphing}
\draw [decorate, decoration = zigzag] (0,0) -- (2,0);
\draw [decorate, decoration = saw, yshift = -6mm] (0,0) -- (2,0);
\draw [decorate, decoration = {random steps, segment length = 2mm}, yshift = -12mm]
   (0,0) -- (2,0);
\draw [decorate, decoration = {zigzag, pre = curveto, post = curveto,
  pre length = 4.5mm, post length = 3mm}] (0,0) arc(180:0:1);
\draw [decorate, decoration = saw, yshift = -8mm] (0,0) arc(180:0:1);
\draw [decorate, decoration = random steps, yshift = -16mm] (0,0) arc(180:0:1);
\draw[decorate, decoration = lineto, yshift = -20mm] (0,0) arc(180:0:1);
```

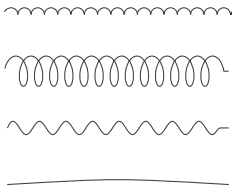
src





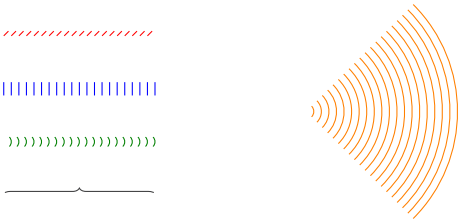
```
\usetikzlibrary{decorations.pathmorphing}
\draw [decorate, decoration = bumps] (0,0) -- (2,0);
\draw [decorate, decoration = {coil, amplitude = 2mm, segment length = 2mm},
  yshift = -5mm] (0,0) -- (2,0);
\draw [decorate, decoration = snake, yshift = -10mm] (0,0) -- (2,0);
\draw [decorate, decoration = bent, yshift = -15mm] (0,0) -- (2,0);
```

src



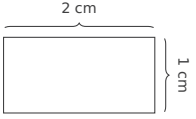
```
\usetikzlibrary{decorations.pathreplacing}
\draw [decorate, decoration = border, segment length = 1mm, red] (0,0) -- (2,0);
\draw [decorate, decoration = ticks, segment length = 1mm, blue, yshift = -7mm]
  (0,0) -- (2,0);
\draw [decorate, decoration = waves, yshift = -14mm, green!50!black,
  segment length = 1mm] (0,0) -- (2,0);
\draw [decorate, decoration = brace, yshift = -21mm] (0,0) -- (2,0);
\draw [decorate, decoration = expanding waves, segment length = 1mm, or-
ange, xshift = 4cm, yshift = -10mm] (0,0) -- (2,0);
```

src



```
\usetikzlibrary{decorations.pathreplacing}
\begin{tikzpicture}[decoration = brace, font = \sffamily\tiny]
\draw (0,0) rectangle (2,1);
\draw [decorate]
  (0,1.1) -- node [above, yshift = 1mm] {2 cm} (2,1.1);
\draw [decorate]
  (2.1,1) -- node [above, sloped, yshift = 1mm] {1 cm} (2.1,0);
```

src

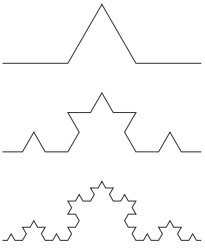


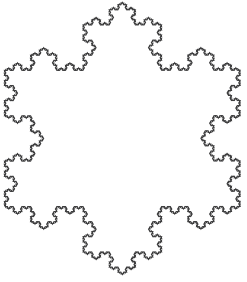
```
\usetikzlibrary{decorations.text, decorations.footprints}

\draw [decorate, decoration = {text along path, text = {text follows the path}}]
  (0,0) arc(180:0:1.01);

\draw [decorate, decoration = {text along path,
  text = {this is ~ a long text along ~ a path}}]
  (0,0) -- (1,0) arc(150:30:1.4) -- (5,0);

\fill [decorate, decoration = {footprints, foot length = 15pt}] (0,0) -- (5,0);

\fill [decorate, decoration = {footprints, foot of = bird, foot length = 5pt}]
  (0,0) -- (5,0);
```

src

```
\usetikzlibrary{decorations.fractals}

\begin{tikzpicture}[decoration = Koch snowflake]
\draw decorate { (0,0) -- (3,0) };
\draw decorate { decorate { (0,0) -- (3,0) } };
\draw decorate { decorate { decorate { (0,0) -- (3,0) } } };
\draw decorate { decorate { decorate { decorate { decorate {
  (210:2) -- (90:2) -- (330:2) -- cycle } } } } };
\end{tikzpicture}
```

src





Outline

1. TikZ
2. **Intellectual Property**
3. LaTeX
4. Scheduling and Grading
5. Homework

Intellectual Property Rights

- patent
- copyright
- industrial design right
- trademark
- plant variety right
- trade dress
- geographical indication

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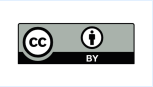

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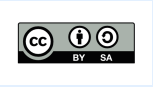

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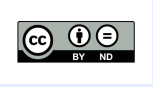

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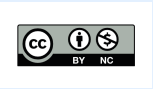

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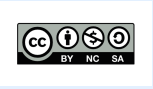

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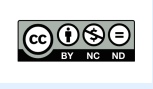

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Software Licenses

- proprietary licence
- permissive licence
- copyleft

Examples

- GNU General Public Licence
- GNU Lesser General Public Licence
- Apache Licence
- BSD Licence (3–clause licence)
- MIT Licence

Outline

1. TikZ
2. Intellectual Property
3. **LaTeX**

   Formulas Hyperlinks Beamer
4. Scheduling and Grading
5. Homework

- multiline subscripts and boxed formulas

```
\sum_{\substack{
    0 \leqslant i \leqslant m \\
    0 < j < k \leqslant n
  }}
  P(i,j,k)
```

$$\sum_{\substack{0\leqslant i\leqslant m\\0<j<k\leqslant n}} P(i,j,k)$$

```
\boxed{\sum_{\begin{subarray}{l}
    0 \leqslant i \leqslant m \\
    0 < j < k \leqslant n
  \end{subarray}}
  P(i,j,k)}
```

src

$$\boxed{\sum_{\substack{0\leqslant i\leqslant m\\0<j<k\leqslant n}} P(i,j,k)}$$

Hyperlinks

- `\usepackage[`*options*`]{hyperref}`
- numerous *options* (`key=value`) also with `\hypersetup{`*options*`}` src

```
\documentclass[12pt]{article}

\usepackage{hyperref}

\begin{document}
See the \hyperlink{target}{next page} for more stuff.
\newpage
\hypertarget{target}{Here} starts the next page.
\end{document}
```

src

Overlays

- `\pause` src
- `\onslide<`*overlay specification*`>{`*text*`}`
- `\uncover<`*overlay specification*`>{`*text*`}`
- `\only<`*overlay specification*`>{`*text*`}`
- `\visible<`*overlay specification*`>{`*text*`}`
- `\invisible<`*overlay specification*`>{`*text*`}`
- `\alt<`*overlay specification*`>{`*default text*`}{`*alternative text*`}` src

Commands with Overlay Specifications

`\alert` `\emph` `\item` `\textbf` `\textcolor` ... src

Guidelines for Creating Presentation (selection)

- at most one frame per minute
- never put anything on slide that will not be explained
- prefer enumerations and itemize environments over plain text
- do not create endless `itemize` or `enumerate` lists
- use block environments
- prefer phrases over complete sentences
- use graphics
- use `\alert` for emphasis but do not overdo it
- conclude presentation with summary
- ...
- avoid "wobbling" overlays example: $e^x = \sum_{n=0}^{\infty} \frac{x^n}{n!}$
- much more in section 5 of beamer class user guide

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Topics

1 chemmacros	5 listings	10 pgfplots	14 tikzmark
2 chessboard	6 mathtools	11 postit	15 tikzpeople
3 cleveref	8 MusiXTeX	12 qrcodetikz	16 tkz-berge
4 enumitem	9 pgf–go	13 TangramTikz	17 todonotes

Assignment

1 Bacher Martin	6 Oppermann Linda	13 Paganini Adriano
2 Weilbacher Jannick	8 Beier Tom Simon	14 Hölzl Sebastian
3 Darsel Esma	8 Küllmar Jan Peter	15 Krause Jakob Moritz
3 Fitz Julia	9 Albrecht Odin	16 Musch Eric Edgar Friedrich
4 Bekhtari Salma	10 Kerber Thomas Martin	17 Freiermuth Marie
4 Ristova Kirjana	11 Ilic Ilija	17 Leinfelder Matthias Christian
5 Krumholz Maya	11 Khakhlou Pavel	
5 Sagerer Marie	12 Ciech Dominique Manuel	

Scheduling

▸ June 11	5	4	11	8	17	9
▸ June 18	10	16	13	14	15	6
▸ June 25	3	12	1	2		

Instructions

- 15 minute presentation using slides with beamer package
- 5 to 10 page report in LIPIcs format (deadline: 10 am on July 3)
- content:
  - functionality
  - examples
  - options
  - ...

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Homework Exercises for May 28

1. Give concrete examples for each of the items listed under Intellectual Property Rights on slide 12. (2)
2. Use TikZ to typeset the diagram on the next slide. (2)
3. Give examples of software products that are licenced under each of the licenses listed on slide 15. (1)

next week (May 28): online evaluation in presence $\Longrightarrow$ bring device