



Introduction to Scientific Working

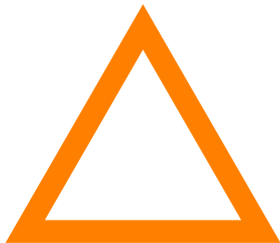
Aart Middeldorp

Outline

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

```
\draw [orange, line width = 3mm]
(90:2) -- (210:2) -- (330:2) -- cycle;
```

```
\draw [orange, line width = 3mm]  
  (90:2) -- (210:2) -- (330:2) -- cycle;
```

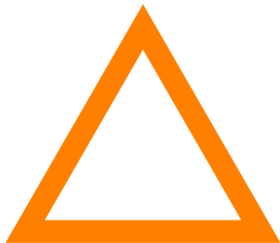


Decorating Paths

```
\draw [red, line width = 5mm]
  (90:2) -- (210:2) -- (330:2) -- cycle;

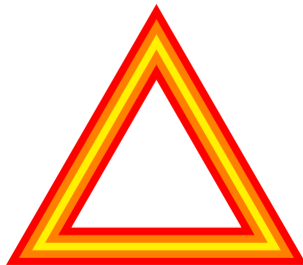
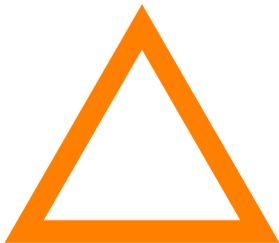
\draw [orange, line width = 3mm]
  (90:2) -- (210:2) -- (330:2) -- cycle;

\draw [yellow, line width = 1mm]
  (90:2) -- (210:2) -- (330:2) -- cycle;
```



Decorating Paths

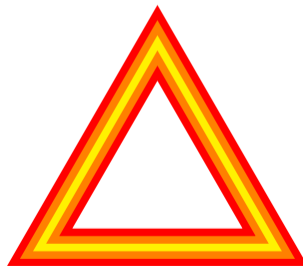
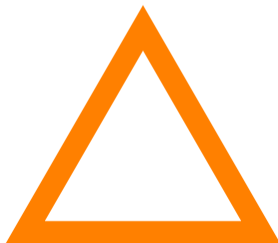
```
\draw [red, line width = 5mm]
  (90:2) -- (210:2) -- (330:2) -- cycle;
\draw [orange, line width = 3mm]
  (90:2) -- (210:2) -- (330:2) -- cycle;
\draw [yellow, line width = 1mm]
  (90:2) -- (210:2) -- (330:2) -- cycle;
```



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);
```

```
\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);
```



```
\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);

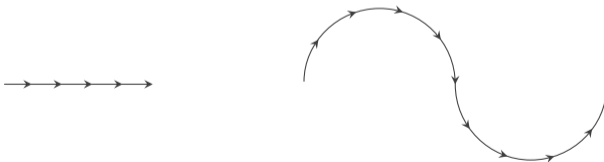
\draw [postaction = decorate,
  decoration = {markings, mark = between positions 0.1 and 1
  step 0.1 with {\arrow{stealth}}}]
  (0,0) arc(180:0:1) arc(-180:0:1);
```



```
\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}
```

```
\usetikzlibrary{decorations.pathmorphing}  
\draw [decorate, decoration = zigzag] (0,0) -- (2,0);
```



```
\usetikzlibrary{decorations.pathmorphing}  
\draw [decorate, decoration = zigzag] (0,0) -- (2,0);  
\draw [decorate, decoration = saw, yshift = -6mm] (0,0) -- (2,0);
```



```
\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);
```



```

\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);

```

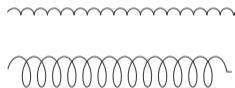
[src](#)


```
\usetikzlibrary{decorations.pathmorphing}  
\draw [decorate, decoration = bumps] (0,0) -- (2,0);
```

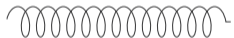
```
\usetikzlibrary{decorations.pathmorphing}  
\draw [decorate, decoration = bumps] (0,0) -- (2,0);
```



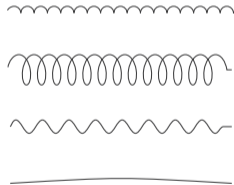
```
\usetikzlibrary{decorations.pathmorphing}
\draw [decorate, decoration = bumps] (0,0) -- (2,0);
\draw [decorate, decoration = {coil, amplitude = 2mm, segment length = 2mm},
      yshift = -5mm] (0,0) -- (2,0);
```



```
\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);
```



```
\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}
```

```
\usetikzlibrary{decorations.pathreplacing}
```

```
\draw [decorate, decoration = border, segment length = 1mm, red] (0,0) -- (2,0);
```



```
\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);
```



```
\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);
```

//////////

|||||

))))))

```

\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);

```

//////////

|||||

))))))

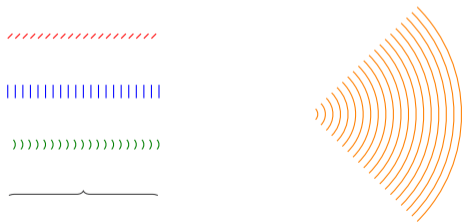
⏟

```

\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

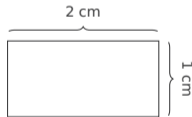


```
\usetikzlibrary{decorations.pathreplacing}
\begin{tikzpicture}[decoration = brace, font = \sffamily\tiny]
\draw (0,0) rectangle (2,1);
\draw [decorate]
(0,1.1) -- node [above, yshift = 1mm] {2 cm} (2,1.1);
\draw [decorate]
(2.1,1) -- node [above, sloped, yshift = 1mm] {1 cm} (2.1,0);
```

```
\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);
```



```
\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);
```

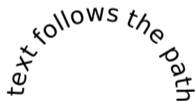
[src](#)

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

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

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

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



text follows the path

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

```
\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);
```

text follows the path

this is a long text along a path

```

\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);

```

text follows the path

this is a long text along a path



```

\usetikzlibrary{decorations.text, decorations.footprints}

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

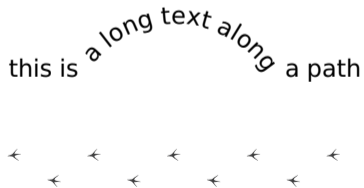
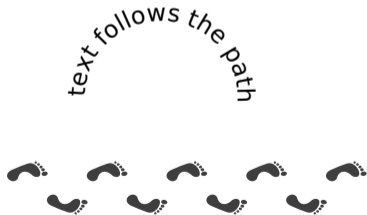
\draw [decorate, decoration = {text along path,
text = {this is ~ a long text along ~ a path}}]
(0,0) -- (1,0) arc(150:30:1.4) -- (5,0);

\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}
```

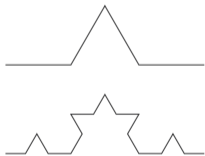
```
\usetikzlibrary{decorations.fractals}
\begin{tikzpicture}[decoration = Koch snowflake]
\draw decorate { (0,0) -- (3,0) };

\end{tikzpicture}
```

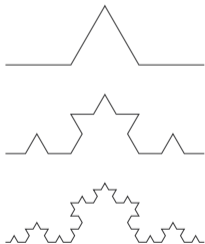


```
\usetikzlibrary{decorations.fractals}
\begin{tikzpicture}[decoration = Koch snowflake]
\draw decorate { (0,0) -- (3,0) };
\draw decorate { decorate { (0,0) -- (3,0) } };

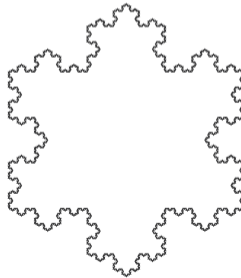
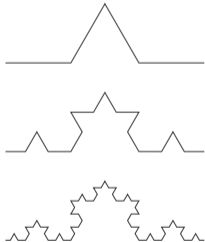
\end{tikzpicture}
```



```
\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) } } };
\end{tikzpicture}
```



```
\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



- ▶ patent



Intellectual Property Rights

- ▶ patent
- ▶ copyright



Intellectual Property Rights

- ▶ patent
- ▶ copyright
- ▶ industrial design right



Intellectual Property Rights

- ▶ patent
- ▶ copyright
- ▶ industrial design right
- ▶ trademark



Intellectual Property Rights

- ▶ patent
- ▶ copyright
- ▶ industrial design right
- ▶ trademark
- ▶ plant variety right



Intellectual Property Rights

- ▶ patent
- ▶ copyright
- ▶ industrial design right
- ▶ trademark
- ▶ plant variety right
- ▶ trade dress



Intellectual Property Rights

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



Intellectual Property Rights

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



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Examples

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Examples

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- ▶ Apache Licence



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Examples

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- ▶ Apache Licence
- ▶ BSD Licence (3–clause licence)



BSD



Software Licenses

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- ▶ permissive licence
- ▶ copyleft



Examples

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



BSD

Outline

1. TikZ

2. Intellectual Property

3. LaTeX

Formulas

Hyperlinks

Beamer

4. Scheduling and Grading

5. Homework

► multiline subscripts

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

► multiline subscripts

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

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

► multiline subscripts

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

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

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

► multiline subscripts

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

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

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

$$\sum_{\begin{subarray}{l} 0 \leq i \leq m \\ 0 < j < k \leq n \end{subarray}} P(i,j,k)$$

► multiline subscripts and boxed formulas

```
\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

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

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

▶ `\usepackage[options]{hyperref}`

► `\usepackage[options]{hyperref}`

```
\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}
```

► `\usepackage[options]{hyperref}`

```
\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

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

▶ `\pause`

src

Overlays

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

Overlays

- ▶ `\pause` src
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- ▶ `\uncover<<overlay specification>>{<text>}`
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- ▶ `\invisible<<overlay specification>>{<text>}`
- ▶ `\alt<<overlay specification>>{<default text>}{<alternative text>}` src

Commands with Overlay Specifications

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

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- ▶ use `\alert` for **emphasis**

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example:
$$e^x = \sum_{n=0}^{\infty} \frac{x^n}{n!}$$

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- ▶ much more in section 5 of `beamer` class user guide

Outline

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

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
 - ▶ ...

Outline

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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

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next week (May 28): online evaluation in presence

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

