Title

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Abstract

Introduction

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

1 Environments

1.1 Theorems and Proofs

```
\begin{The}
\lipsum[2]
\end{The}
```

Theorem 1.1 Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

```
\begin{Proof}
\lipsum[2]
\end{Proof}
```

Proof Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris. □

```
\begin{Pro}
\lipsum[1]
\end{Pro}
```

Proposition 1.2 Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

```
\begin{Le}
\lipsum[2]
\end{Le}
```

Lemma 1.3   Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

```
\begin{Co}
\lipsum[2]
\end{Co}
```

Corollary 1.4   Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

1.2 Definitions, Examples, Remarks

```
\begin{De}
\lipsum[2]
\end{De}
```

Definition 1.5   Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

```
\begin{Exa}
\lipsum[8]
\end{Exa}
```

Example 1.6 Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Donec odio elit, dictum in, hendrerit sit amet, egestas sed, leo. Praesent feugiat sapien aliquet odio. Integer vitae justo. Aliquam vestibulum fringilla lorem. Sed neque lectus, consectetuer at, consectetuer sed, eleifend ac, lectus. Nulla facilisi. Pellentesque eget lectus. Proin eu metus. Sed porttitor. In hac habitasse platea dictumst. Suspendisse eu lectus. Ut mi mi, lacinia sit amet, placerat et, mollis vitae, dui. Sed ante tellus, tristique ut, iaculis eu, malesuada ac, dui. Mauris nibh leo, facilisis non, adipiscing quis, ultrices a, dui.

```
\begin{Rmk}
\lipsum[2]
\end{Rmk}
```

Remark 1.7 Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

There are similar commands to create a Theorem, Proposition... withou numbering. For instance:

```
\begin{Pro*}
\lipsum[2]
\end{Pro*}
```

Proposition   Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

1.3 Description, itemize, enumerate

Description with boxed labels

```
\begin{description}
  \item[\boxlabel{Label 1}{1.5cm}]
        \lipsum[1]
  \item[\boxlabel{Label 2 with a very long comment}{4cm}]
        \lipsum[2]
\end{description}
```

Label 1   Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi

dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Label 2 with a very long comment   Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Description

```
\begin{description}
\item[Label 1] \lipsum[1]
\item[Label 2] \lipsum[2]
\end{description}
```

Label 1   Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Label 2   Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Itemize

```
\begin{itemize}
    \item \lipsum[2]
    \item \lipsum[2]
    \item \lipsum[2]
\end{itemize}
```

◇ Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor
   lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus.
   Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae
   ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut
   massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et
   magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna.
   Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

◇ Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor
   lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus.
   Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae
   ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut
   massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et
   magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna.
   Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

◇ Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor
   lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus.
   Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae
   ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut
   massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et
   magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna.
   Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Enumerate

```
\begin{enumerate}
    \item \lipsum[2]
    \item \lipsum[2]
\end{enumerate}
```

1. Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor
   lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus.
   Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae
   ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut
   massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et
   magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna.
   Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

2. Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor
   lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus.
   Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae
   ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut
   massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et
   magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna.
   Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

1.4 Margin Notes

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Margin note
\note{Note}

> **Remark 1.8** Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris. Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Margin note

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Proof Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris. □

\sub
Different colour
to explain a step
in a proof
\expl{#1}

1.5 Hypertext links, quotes, indices, urls

We obtain a hypertext link with

```
\label{Label}
```

and we call it with

```
\ref{Label}
```

Result: Section 1.5

We quote a book in the bibliography with

```
\cite{LabelBook}
```

Result: [Pud25a]

We add new elements in the analytic index with

```
\index{Index}
    \index{IndexSecondVoice}
\index{Index!ThirdVoice}
\index{Index!ThirdVoice!Part 1}
\index{Index!ThirdVoice!Part 2}
```

The result of this two commands is shown in the analytic index at the end of the document.

We create URL links with

```
\url{https://mattiapuddu25.github.io/main/index.html}
```

Result: https://mattiapuddu25.github.io/main/index.html

2 New commands

\A	\AA	\AAA
𝔸	𝒜	𝒜
𝔹	ℬ	ℬ
ℂ	𝒞	𝒞
𝔻	𝒟	𝒟
𝔼	ℰ	ℰ
𝔽	ℱ	ℱ
𝔾	𝒢	𝒢
ℍ	ℋ	ℋ
𝕀	ℐ	ℐ
𝕁	𝒥	𝒥
𝕂	𝒦	𝒦
𝕃	ℒ	ℒ
𝕄	ℳ	ℳ
ℕ	𝒩	𝒩
𝕆	𝒪	𝒪
ℙ	𝒫	𝒫
ℚ	𝒬	𝒬
ℝ	ℛ	ℛ
𝕊	𝒮	𝒮
𝕋	𝒯	𝒯
𝕌	𝒰	𝒰
𝕍	𝒱	𝒱
𝕎	𝒲	𝒲
𝕏	𝒳	𝒳
𝕐	𝒴	𝒴
ℤ	𝒵	𝒵

Symbols	
\d	d
\e	e
\g	g
\i	ı
\j	ȷ
\k	k
\l	ℓ
\o	o
\one	**1**
\t	t
\Zero	**0**

Operators			Others	
*	.		\Alg	-**Alg**
\binom{A}{B}	$\binom{A}{B}$		\Ann{A}	$\mathrm{Ann}(A)$
\CF{A}	$\langle A\rangle$		\Aut{A}	$\mathrm{Aut}(A)$
\codim{A}{B}	$\mathrm{codim}_B(A)$		\dlim{A}{B}	$\varinjlim_A B$
\Diff{A}{B}	$\mathrm{d}A_B$		\Ext{A}{B}	$A\,\vert\,B$
\dim{A}{B}	$\dim_A(B)$		\Fix{A}	$\mathrm{Fix}(A)$
\exp{A}	$\exp(A)$		\Gal{A}	$\mathrm{Gal}(A)$
\Floor{A}	$\lfloor A\rfloor$		\GalD{A}{B}{C}	$\mathrm{Gal}_C(A\,\vert\,B)$
\Id{A}	Id_A		\GL{A}{B}	$\mathrm{GL}_A(B)$
\Im{A}	$\mathrm{Im}\,(A)$		\GLF{A}	$\mathbf{GL}_A$
\Leg{A}{B}	$\left(\dfrac{A}{B}\right)$		\GLV{A}	$\mathrm{GL}(A)$
\Lie{A}{B}	$[A,B]$		\Grp	**Grp**
\Norma{A}	$\Vert A\Vert$		\Ker{A}	$\mathrm{Ker}(A)$
\PS{A}{B}	(A,B)		\OM{A}{B}	$\mathrm{O}_A(B)$
\rank{A}	$\mathrm{rank}(A)$		\plim{A}{B}	$\varprojlim_A B$
\Re{A}	$\mathrm{Re}(A)$		\Seq{A}{B}{C}	$(A_B)_C$
\Res{A}{B}	$A\vert_B$		\Set{A}	$\{A\}$
\Stirling{A}{B}	$\left[\begin{smallmatrix}A\\B\end{smallmatrix}\right]$		\SetC	**Set**
\SStirling{A}{B}	$\left\{\begin{smallmatrix}A\\B\end{smallmatrix}\right\}$		\SLM{A}{B}	$\mathrm{SL}_A(B)$
\Tr{A}	$\mathrm{Tr}(A)$		\SO{A}{B}	$\mathrm{SO}_A(B)$
\trdeg{A}{B}	$\mathrm{trdeg}_B(A)$		\Span{A}{B}	$\mathrm{Span}_A(B)$
			\Spec{A}	$\mathrm{Spec}(A)$
			\Stab{A}{B}	$\mathrm{Stab}_B(A)$
			\VecF	-**VecF**

2.1 Equations

<u>Equation with label</u>

```
\EqL{Equation with label}{B}
```

$$Equation\ with\ label \qquad [\mathbf{1}]$$

The label appears only if it is called in the document. We do it with

```
\eqref{B}
```

Result: [**1**]

<u>Equation without label</u>

```
\Eq{A & B\\ C & D}
```

$$AB$$
$$CD$$

2.1.1 Arrows

$\tow\{Text\}$	$\xrightarrow{Text}$
$\two$	$\twoheadrightarrow$
$\two\{Text\}$	$\xtwoheadrightarrow{Text}$
$\hook$	$\hookrightarrow$
$\longtwoheadrightarrow$	$\longrightarrow\!\!\!\!\rightarrow$
$\longto$	$\longrightarrow$

2.1.2 Maps

<u>Map with a name</u>

```
\[\Map{A}{B}{C}{D}{E}\]
```

$$A:\quad \begin{aligned} B &\to C \\ D &\mapsto E \end{aligned}$$

<u>Map without a name</u>

```
\[\NMap{A}{B}{C}{D}\]
```

$$\begin{aligned} A &\to B \\ C &\mapsto D \end{aligned}$$

Functors

`\Functor{A}{B}{C}{D}{E}{F}{G}{H}{I}`

$$
\begin{array}{ccc}
A: & B \longrightarrow C & \\
 & D \longmapsto E & \\
 & \scriptstyle H \downarrow \quad\quad \downarrow \scriptstyle I & \\
 & F \longmapsto G &
\end{array}
$$

`\FunctorC{A}{B}{C}{D}{E}{F}{G}{H}{I}`

$$
\begin{array}{ccc}
A: & B \longrightarrow C & \\
 & D \longmapsto E & \\
 & \scriptstyle H \downarrow \quad\quad \uparrow \scriptstyle I & \\
 & F \longmapsto G &
\end{array}
$$

`\NFunctor{A}{B}{C}{D}{E}{F}{G}{H}`

$$
\begin{array}{cc}
A \longrightarrow B \\
C \longmapsto D \\
\scriptstyle G \downarrow \quad\quad \downarrow \scriptstyle H \\
E \longmapsto F
\end{array}
$$

`\NFunctorC{A}{B}{C}{D}{E}{F}{G}{H}`

$$
\begin{array}{cc}
A \longrightarrow B \\
C \longmapsto D \\
\scriptstyle G \downarrow \quad\quad \uparrow \scriptstyle H \\
E \longmapsto F
\end{array}
$$

`\Functor{A}{B}{C}{D}{E}{F}{G}{H}{I}`
`\FunctorComplete{A}{B}`

$$
\begin{array}{ccc}
A: & B \longrightarrow C & \\
 & D \longmapsto E & \scriptstyle A \\
 & \scriptstyle H \downarrow \quad\quad \downarrow \scriptstyle I \;\; \uparrow\downarrow & \\
 & F \longmapsto G & \scriptstyle B
\end{array}
$$

2.2 Chapter introductions

```
\begin{Intro}[colbacktitle=gray!80, width=\textwidth]
{Title}
{\lipsum[2]}
\end{Intro}
```

> **Title**
>
> Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

```
\begin{RightIntro}[colbacktitle=gray!80, width=\textwidth]
{Title}
{\lipsum[2]}
\end{RightIntro}
```

> **Title**
>
> Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

```
\begin{Boxed}
\lipsum[2]
\end{Boxed}
```

> Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

`\UnderlineBox{\lipsum[2]}`

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor
lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus.
Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae
ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut
massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et
magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna.
Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

2.3 Minipage and wrapfigure

`\Minipage{0.49}{Left page}{0.49}{Right page}`

Left page   Right page (to avoid overfull warnings, the
                                                    sum of the two numbers should be strictly
                                                    less than 1)

`\EvOdd{5}{.5\textwidth}{Text or picture}`

Text before: Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi
auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus.
Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare
odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras
nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient
montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum
turpis. Pellentesque cursus luctus mauris. **Text after**:

Text or picture (The first command is the
number of lines, the second command is
the width of the space to be used, the third
command is the content of the space): this
part is always at the external border of the
page

Nam dui ligula, fringilla a, eui-
smod sodales, sollicitudin vel,
wisi. Morbi auctor lorem non
justo. Nam lacus libero, pre-
tium at, lobortis vitae, ultricies
et, tellus. Donec aliquet, tortor
sed accumsan bibendum, erat li-
gula aliquet magna, vitae ornare

odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec
ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes,
nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis.
Pellentesque cursus luctus mauris.

2.4 Quotes

```
\Quote{Quote}{Author}
```

Quote

Author

2.5 The package "polynomial"

The package "polynomial" offers an easier typesetting for polynomials. We only write the coefficients: the variable and the exponents are handled through the options at the beginning of the command. An exhaustive list of available commands is the following:

```
\polynomial{1,1,2,c,0,0,0,0,5}
```
$$1 + x + 2x^2 + cx^3 + 5x^8$$

```
\polynomialfrac{1,1,2,c,0,0,0,0,5}{0,1,1,4}
```
$$\frac{1 + x + 2x^2 + cx^3 + 5x^8}{x + x^2 + 4x^3}$$

```
\polynomial[falling]{a,b,c,-d,e}
```
$$a + bx^{-1} + cx^{-2} - dx^{-3} + ex^{-4}$$

```
\polynomial[reciprocal]{a,b,c,d,e}
```
$$ax^4 + bx^3 + cx^2 + dx + e$$

```
\polynomial[var=t]{1,1,2,c,0,0,0,0,5}
```
$$1 + t + 2t^2 + ct^3 + 5t^8$$

```
\polynomial[start=100]{1,1,2,c,0,0,5}
```
$$x^{100} + x^{101} + 2x^{102} + cx^{103} + 5x^{106}$$

```
\polynomial[step=-5]{1,1,2,c}
```
$$1 + x^{-5} + 2x^{-10} + cx^{-15}$$

```
\polynomial[add=\otimes]{1,1,2,c,0,0,5}
```
$$1 \otimes x \otimes 2x^2 \otimes cx^3 \otimes 5x^6$$

```
\polynomial[sub=\times]{1,2,-c,0,0,0,0,-5}
```
$$1 + 2x \times cx^2 \times 5x^6$$

2.6 The package "accents"

The package "accents" offers a better typesetting of accented letters in mathematical environments. For instance:

```
\underaccent{under}{text}
```
$$\underaccent{under}{text}$$

```
\accentset{over}{text}
```
$$\accentset{over}{text}$$

```
\overrightarrow{text}
```
$$\overrightarrow{text}$$

```
\underrightarrow{text}
```
$$\underrightarrow{text}$$

$$\xrightarrow[below]{above} \qquad \xrightarrow[below]{above}$$

$$\overset{above}{text} \qquad \overset{above}{text}$$

$$\underset{below}{above} \qquad \underset{below}{above}$$

$$\[\sideset{_a^b}{_c^d}\sum\] \qquad {}_a^b\sum_c^d$$

2.7 Typesetting of inline equations

Text $\tfrac{N}{D}$ Text

Text $\frac{N}{D}$ Text

Text $\nicefrac{N}{D}$ Text

Text N/D Text

Text $\tbinom{N}{D}$ Text

Text $\binom{N}{D}$ Text

3 PGF and Tikzpicture

3.1 Boxes

\boxed{Prova}

$$\boxed{Prova}$$

\begin{Intro}[colbacktitle=red]{Titolo}{Testo}\end{Intro}

Other alternatives are given by the environments listed in Section 2.2.

3.2 PGF (see also the manual of the package "pgfplots" on ctan.org)

This section presents only a few examples. Due to Overleaf's reduced compilation time in the free version, I include some of the images generated by the code shown in verbatim.

```
\begin{figure}[ht]
\centering
\begin{tikzpicture}[scale=1.75]
    \begin{axis}[xmin=-0.5, xmax=5, ymin=-0.5,
    axis equal, xtick=data, ytick=data, grid=major]

        \addplot[only marks] coordinates {(4,1) (3,1) (1.5,3)};

        \addplot[mesh, domain=0:2.5, tick=\empty]
            {(x-.5)^2}  node [pos=.25, pin=0.4:$p$] {$\bullet$}
                        node [pos=.6, sloped, xshift=.05cm, yshift=-.2cm]
                            {\scriptsize $y=(x-\nicefrac12)^2$};
    \end{axis}
\end{tikzpicture}\noindent\hspace{2cm}
\caption{Points and graphs}
\end{figure}
```
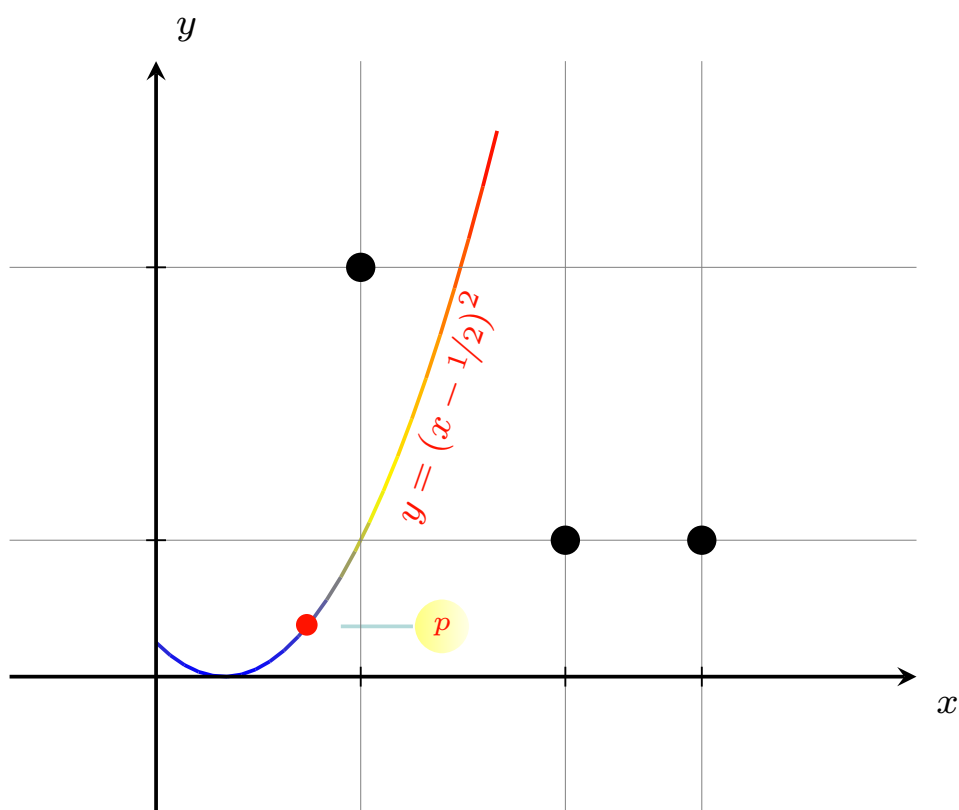

Figure 1. Points and graphs

```
\begin{figure}[ht]
\centering
\begin{tikzpicture}[scale=1.8]
    \begin{axis}[xmin=-1.5, xmax=1.5, ymin=-1.5, ymax=1.5, axis equal]

        \addplot[samples=48, domain=0:2*pi, -latex, variable=\t,
            quiver={u={-sin(deg(t))},
                    v={cos(deg(t))},
                    scale arrows=0.75,
                    colored=red}]
                ({cos(deg(t))}, {sin(deg(t))});

        \addplot[samples=36, domain=0:2*pi]
            ({cos(deg(x))}, {sin(deg(x))});
    \end{axis}
\end{tikzpicture}
\caption{Parametrizations}
\end{figure}
```

```
\begin{figure}[ht]
\centering
\begin{tikzpicture}[scale=1.5]
    \begin{axis}[xmin=-5, xmax=5, ymin=-28, axis equal]

        \addplot[samples=24, domain=0:2*pi, dashed, data cs=polar,
        top color=Blues-I, bottom color=Blues-B] (deg(x),30);

        \addplot[name path=Y, samples=24, domain=0:2*pi, dashed,
        data cs=polar] (deg(x),30);

        \addplot[GnBu-M, name path=X, domain=0:360, samples=36, smooth,
        data cs=polar] (x, {30-8*sin(3*x)});

        \addplot[green] fill between[of=Y and X];

        \addplot [samples=36,domain=0:30, dashed, data cs=cart]
        {.025*x^2} node [pos=1.1] {Node};

        \addplot[mark=oplus, only marks] coordinates {(0,0)};
        \node[pin=120:{Pin}] at (0,0) {};
    \end{axis}
\end{tikzpicture}
\caption{Nodes and filling}
\end{figure}
```
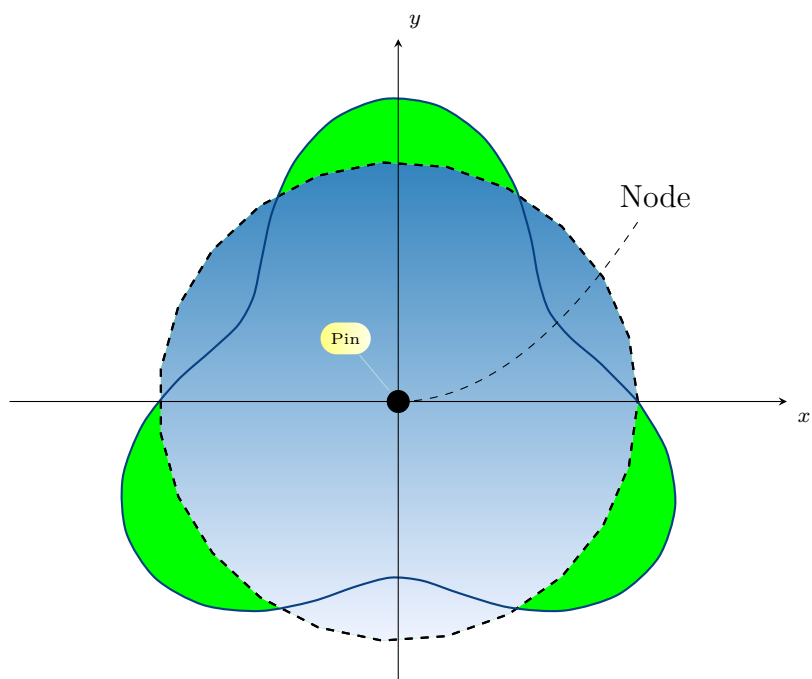

Figure 2. Nodes and filling

```
\begin{figure}[ht]
\centering
\begin{tikzpicture}[scale=1.75]
    \begin{axis}[xmin=-1, xmax=2, ymin=-3.5, ymax=1, axis equal=false]

        \addplot[red, patch type sampling, patch type= cubic spline,
        domain=0:2, smooth]{ln(x)};

        \draw (0,0) .. controls (1,-1.2) and (1,1) .. (2,1);
    \end{axis}
\end{tikzpicture}
\caption{Interpolation and paths}
\end{figure}
```

```
\begin{figure}[ht]
\centering
\begin{tikzpicture}[scale=1.75]
    \begin{axis}[colormap/PuBu, samples=10, domain=-4:4, y domain=-4:4,
    xmin=-4, xmax=4, ymin=-4, ymax=4, enlargelimits=false]

    \addplot3[surf, samples=18, samples y=36]{x^2+y^2-1};
\end{axis}
\end{tikzpicture}
\caption{3D Surfaces}
\end{figure}
```

```
\begin{figure}[ht]
\centering
\begin{tikzpicture}[spy using outlines={}]
    \begin{axis}[xmin=-1, xmax=6, ymin=0, ymax=1,
    axis equal=false, grid=major, xtick=data, ytick=data,
    every axis plot post/.append style={thick}]

        \addplot[line join=round, green]
            coordinates {(1, 0) (1,.75) (3, 0.9) (4, .75) (5, 0.8)};

        \addplot[line join=bevel, blue]
            coordinates {(0, 0) (1, 0.4) (3, 0.2) (4, 1) (5, 0.9)};

        \coordinate (spypoint)     at (1,.4);

        \coordinate (magnifyglass) at (-2,.25);
\end{axis}
\spy[blue, size=1.5cm, circle, magnification=5, connect spies]
    on (spypoint) in node[fill=white]
                at (magnifyglass);
\end{tikzpicture}
\caption{Spy}
\end{figure}
```
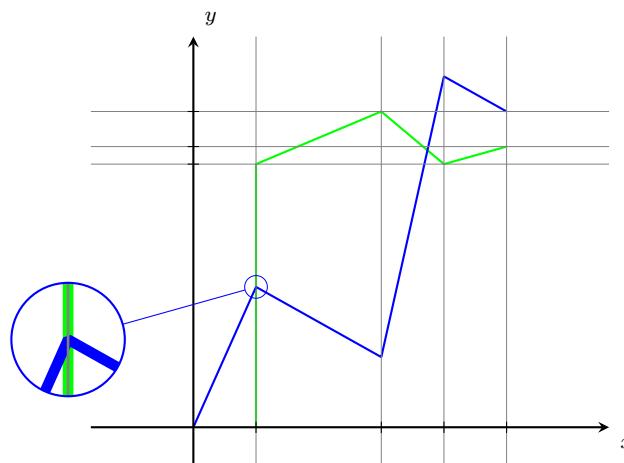

Figure 3. Spy

3.2   PGF (see also the manual of the
package "pgfplots" on ctan.org)
                                    3   PGF and Tikzpicture

```
\begin{figure}[ht]
\centering
\begin{tikzpicture}[scale=1.75]
\begin{axis}[xmin=0, xmax=3.5, ymin=0, ymax=5]

        \draw [name path=A] (2,3) ellipse (1.5 and 1.25);

        \draw [name path=B] (1.5,1.5) rectangle (3,5);

        \fill [red, opacity=.5, name intersections={of=A and B}]
              (intersection-1) circle (2pt) node[above right] {1}
              (intersection-2) circle (2pt) node[above left] {2}
              (intersection-3) circle (2pt) node[below left] {3}
              (intersection-4) circle (2pt) node[below right] {4};
\end{axis}
\end{tikzpicture}
\caption{Intersections}
\end{figure}
```
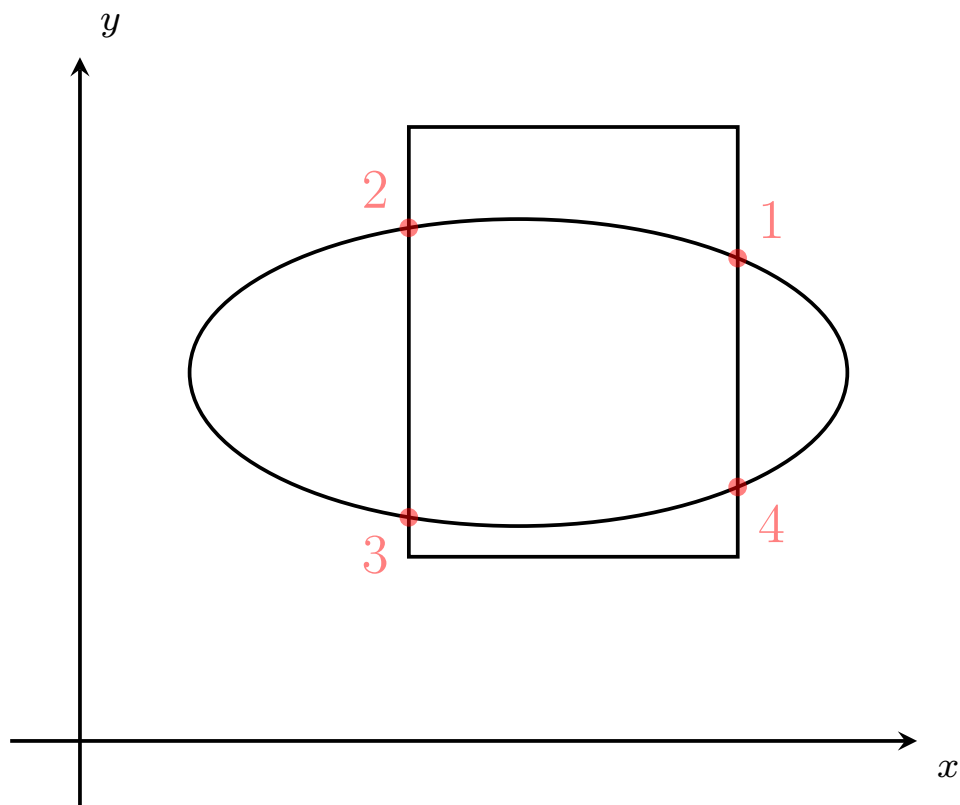

Figure 4. Intersections

```
\begin{figure}[ht]
\centering
\tdplotsetmaincoords{70}{135}
\begin{tikzpicture}[scale=3, tdplot_main_coords]

    \tdplotsphericalsurfaceplot[parametricfill]{36}{36}
        {sqrt(15/2)*sin(\tdplottheta)*cos(\tdplottheta)}
        {black!10}{\tdplotphi};

    {\draw[color=black,thick,->] (0,0,0) -- (2,0,0)
        node[anchor=north east]{$x$};}

    {\draw[color=black,thick,->] (0,0,0) -- (0,2,0)
        node[anchor=north west]{$y$};}

    {\draw[color=black,thick,->] (0,0,0) -- (0,0,2)
        node[anchor=south]{$z$};}
\end{tikzpicture}
\caption{Tikz-3dplot}
\end{figure}
```

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Appendices

A Title

There once was a very smart but sadly blind duck. When it was still a small duckling it was renowned for its good vision. But sadly as the duck grew older it caught a sickness which caused its eyesight to worsen. It became so bad, that the duck couldn't read the notes it once took containing much of inline math just like its favoured equation: $d = u_c \cdot k$. Only displayed equations remained legible so it could still read

$$d = ra^k e.$$

That annoyed the smart duck, as it wasn't able to do its research any longer. It called for its underduckling and said: "Go, find me the best eye ducktor there is. He shall heal me from my disease!"

Bibliography

[Pud]   Mattia Puddu, *Title*, <https://mattiapuddu25.github.io/index.html>.

[Pud25a] ——, *Title*, Publisher, 2025.

[Pud25b] ——, *Title*, Journal (2025), 1–100.

Analytic Index