

Sergei Chae

# 제작을 위한 그래스호퍼

파사드를 중심으로

December 24, 2022

Springer Nature



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# Foreword

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## Preface

본 책에서는 파라메트릭(parametric) 또는 procedural 모델링이라고 불리는 방법을 수행하는 그래스호퍼(grasshopper)<sup>1</sup>를 이용해 제작가능한 수준의 3d 모델을 만들고, 데이터를 추출하는 법에 대해서 다룹니다. 그렇기 때문에 본 책의 내용은 디자인보다는 좀더 공학에 가깝고, 수학과 같이 정해진 답을 찾는 과정에 가깝습니다. 어떤분들은 이런 내용을 싫어할지 모르지만, 여러분의 작업물이 paper architect가 아닌 실제로 지어지기 위해서는 굉장히 중요한 내용입니다.

많은 분들은 **그래스호퍼** 하면 마치 비정형 건물을 다뤄야 할 것이라고 생각하지만, 파라메트릭 또는 procedural라는 단어에서 보듯 파라미터(parameter)만 변경해서 재사용할 수 있는 작업절차를 만들고, 이후에 입력값인 파라미터만 변경해 같은 작업절차를 반복 사용하는 도구이기 때문에 **비정형을 만드는 도구가 아닌 작업을 효율적으로 만들어 주는 도구입니다.**

따라서 본 책에서는 크게 두가지 주제를 다룹니다.

**첫번째**는 지오메트리(geometry)를 조정해, 제작에 용이한 지오메트리로 변경하는 과정을 다룹니다. 여기서 제작에 용이한 지오메트리는 전개가능한 형상(developable surface)을 뜻하고, 이를 다시 풀어쓰면 변형(deformation)없이 2d 전개도를 만들 수 있는 3d 형상을 뜻합니다.

**두번째**는 만들어진 지오메트리로 부터 제작가능한 데이터(data)를 추출하는 작업에 대해서 다룹니다. 실제로 공장기계(manufacturing machine)에 따라 요구하는 데이터는 다릅니다. 대표적으로는 2d 전개도가 있지만, 곡면 패널의 경우 2d 전개도와 더불어 각 전개도에 대응되는 R(radius)값을 요구하기도 합니다. 따라서 이러한 주제도 다룹니다.

위 두가지를 수행하기 위해 필요한 플러그인 사용법과 간단한 스크립팅 내용도 포함합니다.

Seoul, Korea,  
Dec 2022

채희진  
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<sup>1</sup> <https://www.grasshopper3d.com/>





## Acknowledgements

Use the template *acknow.tex* together with the document class `SVMono` (monograph-type books) or `SVMult` (edited books) if you prefer to set your acknowledgement section as a separate chapter instead of including it as last part of your preface.



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Use the template *acronym.tex* together with the document class SVMono (monograph-type books) or SVMult (edited books) to style your list(s) of abbreviations or symbols.

Lists of abbreviations, symbols and the like are easily formatted with the help of the Springer-enhanced `description` environment.

|      |   |
|------|---|
| ABC  | Spelled-out abbreviation and definition |
| BABI | Spelled-out abbreviation and definition |
| CABR | Spelled-out abbreviation and definition |



**Part I**  
**지오메트리(Geometry)**

지오메트리에 대한 간단한 이해 없이는 제작 가능한 수준의 3d 모델을 만들 수 없습니다. 본 장에서는 아주 간단하게 지오메트리와 관련된 내용을 다루고, 3d 모델을 제작에 용이한 지오메트리로 바꾸는 방법에 대해서 다룹니다.



# Chapter 1

## 지오테트리

**Abstract** Each chapter should be preceded by an abstract (no more than 200 words) that summarizes the content. The abstract will appear *online* at [www.SpringerLink.com](http://www.SpringerLink.com) and be available with unrestricted access. This allows unregistered users to read the abstract as a teaser for the complete chapter.

Please use the 'starred' version of the new `abstract` command for typesetting the text of the online abstracts (cf. source file of this chapter template `abstract`) and include them with the source files of your manuscript. Use the plain `abstract` command if the abstract is also to appear in the printed version of the book.

### 1.1 Section Heading

Use the template *chapter.tex* together with the document class `SVMono` (monograph-type books) or `SVMult` (edited books) to style the various elements of your chapter content conformable to the Springer Nature layout. 그레이서?

Nothing happens? ddd [1] [?] ]

### 1.2 Section Heading

Instead of simply listing headings of different levels we recommend to let every heading be followed by at least a short passage of text. Furtheron please use the  $\LaTeX$  automatism for all your cross-references and citations.

Please note that the first line of text that follows a heading is not indented, whereas the first lines of all subsequent paragraphs are.

HI!  
안녕?

Use the standard `equation` environment to typeset your equations, e.g.

$$a \times b = c, \quad (1.1)$$

however, for multiline equations we recommend to use the `eqnarray` environment<sup>1</sup>.

$$|\nabla U_\alpha^\mu(y)| \leq \frac{1}{d-\alpha} \int \left| \nabla \frac{1}{|\xi-y|^{d-\alpha}} \right| d\mu(\xi) = \int \frac{1}{|\xi-y|^{d-\alpha+1}} d\mu(\xi) \quad (1.2)$$

$$= (d-\alpha+1) \int_{d(y)}^{\infty} \frac{\mu(B(y,r))}{r^{d-\alpha+2}} dr \leq (d-\alpha+1) \int_{d(y)}^{\infty} \frac{r^{d-\alpha}}{r^{d-\alpha+2}} dr \quad (1.3)$$

### 1.2.1 Subsection Heading

Instead of simply listing headings of different levels we recommend to let every heading be followed by at least a short passage of text. Further on please use the  $\LaTeX$  automatism for all your cross-references and citations as has already been described in Sect. B.2.

Please do not use quotation marks when quoting texts! Simply use the `quotation` environment – it will automatically be rendered in the preferred layout.

#### 1.2.1.1 Subsubsection Heading

Instead of simply listing headings of different levels we recommend to let every heading be followed by at least a short passage of text. Furtheron please use the  $\LaTeX$  automatism for all your cross-references and citations as has already been described in Sect. B.2.1, see also Fig. B.1<sup>2</sup>

Please note that the first line of text that follows a heading is not indented, whereas the first lines of all subsequent paragraphs are.

#### Paragraph Heading

Instead of simply listing headings of different levels we recommend to let every heading be followed by at least a short passage of text. Furtheron please use the  $\LaTeX$  automatism for all your cross-references and citations as has already been described in Sect. B.2.

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<sup>1</sup> In physics texts please activate the class option `vecphys` to depict your vectors in *boldface-italic* type - as is customary for a wide range of physical subjects.

<sup>2</sup> If you copy text passages, figures, or tables from other works, you must obtain *permission* from the copyright holder (usually the original publisher). Please enclose the signed permission with the manuscript. The sources must be acknowledged either in the captions, as footnotes or in a separate section of the book.

Please note that the first line of text that follows a heading is not indented, whereas the first lines of all subsequent paragraphs are.

For typesetting numbered lists we recommend to use the `enumerate` environment – it will automatically render Springer’s preferred layout.

1. Livelihood and survival mobility are oftentimes coutcomes of uneven socioeconomic development.
  - a. Livelihood and survival mobility are oftentimes coutcomes of uneven socioeconomic development.
  - b. Livelihood and survival mobility are oftentimes coutcomes of uneven socioeconomic development.
2. Livelihood and survival mobility are oftentimes coutcomes of uneven socioeconomic development.

### *Subparagraph Heading*

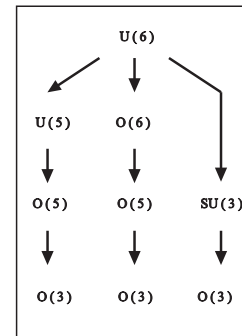
In order to avoid simply listing headings of different levels we recommend to let every heading be followed by at least a short passage of text. Use the  $\LaTeX$  automatism for all your cross-references and citations as has already been described in Sect. B.2, see also Fig. B.2.

Please note that the first line of text that follows a heading is not indented, whereas the first lines of all subsequent paragraphs are.

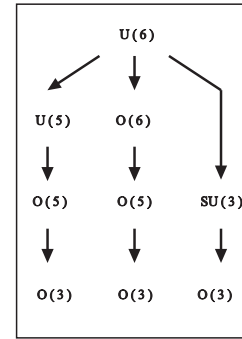
For unnumbered list we recommend to use the `itemize` environment – it will automatically render Springer’s preferred layout.

- Livelihood and survival mobility are oftentimes coutcomes of uneven socioeconomic development, cf. Table B.1.
  - Livelihood and survival mobility are oftentimes coutcomes of uneven socioeconomic development.
  - Livelihood and survival mobility are oftentimes coutcomes of uneven socioeconomic development.

**Fig. 1.1** If the width of the figure is less than 7.8 cm use the `sidecaption` command to flush the caption on the left side of the page. If the figure is positioned at the top of the page, align the sidecaption with the top of the figure – to achieve this you simply need to use the optional argument `[t]` with the `sidecaption` command



**Fig. 1.2** Please write your figure caption here



**Table 1.1** Please write your table caption here

| Classes     | Subclass          | Length     | Action Mechanism                      |
|-------------|-------------------|------------|---------------------------------------|
| Translation | mRNA <sup>a</sup> | 22 (19–25) | Translation repression, mRNA cleavage |
| Translation | mRNA cleavage     | 21         | mRNA cleavage                         |
| Translation | mRNA              | 21–22      | mRNA cleavage                         |
| Translation | mRNA              | 24–26      | Histone and DNA Modification          |

<sup>a</sup> Table foot note (with superscript)

- Livelihood and survival mobility are oftentimes outcomes of uneven socioeconomic development.

**Run-in Heading Boldface Version** Use the  $\LaTeX$  automatism for all your cross-references and citations as has already been described in Sect. B.2.

**Run-in Heading Boldface and Italic Version** Use the  $\LaTeX$  automatism for all your cross-references and citations as has already been described in Sect. B.2.

**Run-in Heading Displayed Version**

Use the  $\LaTeX$  automatism for all your cross-references and citations as has already been described in Sect. B.2.

### 1.3 Section Heading

Instead of simply listing headings of different levels we recommend to let every heading be followed by at least a short passage of text. Furtheron please use the  $\LaTeX$  automatism for all your cross-references and citations as has already been described in Sect. B.2.

Please note that the first line of text that follows a heading is not indented, whereas the first lines of all subsequent paragraphs are.

If you want to list definitions or the like we recommend to use the Springer-enhanced `description` environment – it will automatically render Springer’s preferred layout.

- Type 1    That addresses central themes pertaining to migration, health, and disease. In Sect. B.1, Wilson discusses the role of human migration in infectious disease distributions and patterns.
- Type 2    That addresses central themes pertaining to migration, health, and disease. In Sect. B.2.1, Wilson discusses the role of human migration in infectious disease distributions and patterns.

### 1.3.1 Subsection Heading

In order to avoid simply listing headings of different levels we recommend to let every heading be followed by at least a short passage of text. Use the  $\LaTeX$  automatism for all your cross-references and citations as has already been described in Sect. B.2.

Please note that the first line of text that follows a heading is not indented, whereas the first lines of all subsequent paragraphs are.

If you want to emphasize complete paragraphs of texts we recommend to use the newly defined Springer class option `graybox` and the newly defined environment `svgraybox`. This will produce a 15 percent screened box ‘behind’ your text.

If you want to emphasize complete paragraphs of texts we recommend to use the newly defined Springer class option and environment `svgraybox`. This will produce a 15 percent screened box ‘behind’ your text.

#### 1.3.1.1 Subsubsection Heading

Instead of simply listing headings of different levels we recommend to let every heading be followed by at least a short passage of text. Furtheron please use the  $\LaTeX$  automatism for all your cross-references and citations as has already been described in Sect. B.2.

Please note that the first line of text that follows a heading is not indented, whereas the first lines of all subsequent paragraphs are.

**Theorem 1.1** *Theorem text goes here.*

**Definition 1.1** Definition text goes here.

**Proof** Proof text goes here. □

### Paragraph Heading

Instead of simply listing headings of different levels we recommend to let every heading be followed by at least a short passage of text. Furtheron please use the  $\LaTeX$  automatism for all your cross-references and citations as has already been described in Sect. B.2.

Note that the first line of text that follows a heading is not indented, whereas the first lines of all subsequent paragraphs are.

**Theorem 1.2** *Theorem text goes here.*

**Definition 1.2** Definition text goes here.

**Proof** Proof text goes here. □

### Trailer Head

If you want to emphasize complete paragraphs of texts in an **Trailer Head** we recommend to use

```
\begin{trailer}{Trailer Head}
...
\end{trailer}
```

---

### ? Questions

If you want to emphasize complete paragraphs of texts in an **Questions** we recommend to use

```
\begin{question}{Questions}
...
\end{question}
```

---

### > Important

If you want to emphasize complete paragraphs of texts in an **Important** we recommend to use

```
\begin{important}{Important}
...
\end{important}
```

---

**! Attention**

If you want to emphasize complete paragraphs of texts in an **Attention** we recommend to use

```
\begin{warning}{Attention}
...
\end{warning}
```

---

**Program Code**

If you want to emphasize complete paragraphs of texts in an **Program Code** we recommend to use

```
\begin{programcode}{Program Code}
\begin{verbatim}...\end{verbatim}
\end{programcode}
```

---

**Tips**

If you want to emphasize complete paragraphs of texts in an **Tips** we recommend to use

```
\begin{tips}{Tips}
...
\end{tips}
```

---

**Overview**

If you want to emphasize complete paragraphs of texts in an **Overview** we recommend to use

```
\begin{overview}{Overview}
...
\end{overview}
```

---

### Background Information

If you want to emphasize complete paragraphs of texts in an **Background Information** we recommend to use

```
\begin{backgroundinformation}{Background Information}
...
\end{backgroundinformation}
```

---

### Legal Text

If you want to emphasize complete paragraphs of texts in an **Legal Text** we recommend to use

```
\begin{legalttext}{Legal Text}
...
\end{legalttext}
```

---

**Acknowledgements** If you want to include acknowledgments of assistance and the like at the end of an individual chapter please use the `acknowledgement` environment – it will automatically render Springer’s preferred layout.

## Appendix

When placed at the end of a chapter or contribution (as opposed to at the end of the book), the numbering of tables, figures, and equations in the appendix section continues on from that in the main text. Hence please *do not* use the `appendix` command when writing an appendix at the end of your chapter or contribution. If there is only one the appendix is designated “Appendix”, or “Appendix 1”, or “Appendix 2”, etc. if there is more than one.

$$a \times b = c \quad (1.4)$$

## Problems

**1.1** A given problem or Exercise is described here. The problem is described here. The problem is described here.

### 1.2 Problem Heading

- (a) The first part of the problem is described here.
- (b) The second part of the problem is described here.



## **References**

- [1] Rhino Tutorials. The Morpheus Hotel: From Design to Production: Live Webinar, February 2017.



## Appendix A

### Chapter Heading

*All's well that ends well*

Use the template *appendix.tex* together with the Springer document class SVMono (monograph-type books) or SVMult (edited books) to style appendix of your book.

#### A.1 Section Heading

Instead of simply listing headings of different levels we recommend to let every heading be followed by at least a short passage of text. Furtheron please use the  $\LaTeX$  automatism for all your cross-references and citations.

##### A.1.1 Subsection Heading

Instead of simply listing headings of different levels we recommend to let every heading be followed by at least a short passage of text. Furtheron please use the  $\LaTeX$  automatism for all your cross-references and citations as has already been described in Sect. A.1.

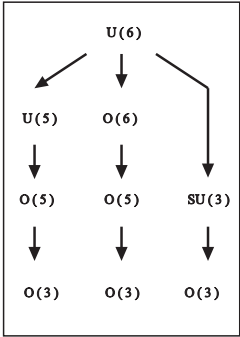
For multiline equations we recommend to use the `eqnarray` environment.

$$\begin{array}{l} \mathbf{a} \times \mathbf{b} = \mathbf{c} \\ \mathbf{a} \times \mathbf{b} = \mathbf{c} \end{array} \quad (\text{A.1})$$

##### A.1.1.1 Subsubsection Heading

Instead of simply listing headings of different levels we recommend to let every heading be followed by at least a short passage of text. Furtheron please use the  $\LaTeX$  automatism for all your cross-references and citations as has already been described in Sect. A.1.1.

**Fig. A.1** Please write your figure caption here



Please note that the first line of text that follows a heading is not indented, whereas the first lines of all subsequent paragraphs are.

**Table A.1** Please write your table caption here

| Classes     | Subclass          | Length     | Action Mechanism                      |
|-------------|-------------------|------------|---------------------------------------|
| Translation | mRNA <sup>a</sup> | 22 (19–25) | Translation repression, mRNA cleavage |
| Translation | mRNA cleavage     | 21         | mRNA cleavage                         |
| Translation | mRNA              | 21–22      | mRNA cleavage                         |
| Translation | mRNA              | 24–26      | Histone and DNA Modification          |

<sup>a</sup> Table foot note (with superscript)

## Appendix B

○ ○ ○ ○

**Abstract** Each chapter should be preceded by an abstract (no more than 200 words) that summarizes the content. The abstract will appear *online* at [www.SpringerLink.com](http://www.SpringerLink.com) and be available with unrestricted access. This allows unregistered users to read the abstract as a teaser for the complete chapter.

Please use the 'starred' version of the new `abstract` command for typesetting the text of the online abstracts (cf. source file of this chapter template `abstract`) and include them with the source files of your manuscript. Use the plain `abstract` command if the abstract is also to appear in the printed version of the book.

### B.1 Section Heading

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### B.2 Section Heading

Instead of simply listing headings of different levels we recommend to let every heading be followed by at least a short passage of text. Furtheron please use the  $\LaTeX$  automatism for all your cross-references and citations.

Please note that the first line of text that follows a heading is not indented, whereas the first lines of all subsequent paragraphs are.

HI!

안녕?

Use the standard `equation` environment to typeset your equations, e.g.

$$a \times b = c, \quad (\text{B.1})$$

however, for multiline equations we recommend to use the `eqnarray` environment<sup>1</sup>.

$$|\nabla U_\alpha^\mu(y)| \leq \frac{1}{d-\alpha} \int \left| \nabla \frac{1}{|\xi-y|^{d-\alpha}} \right| d\mu(\xi) = \int \frac{1}{|\xi-y|^{d-\alpha+1}} d\mu(\xi) \quad (\text{B.2})$$

$$= (d-\alpha+1) \int_{d(y)}^\infty \frac{\mu(B(y,r))}{r^{d-\alpha+2}} dr \leq (d-\alpha+1) \int_{d(y)}^\infty \frac{r^{d-\alpha}}{r^{d-\alpha+2}} dr \quad (\text{B.3})$$

### B.2.1 Subsection Heading

Instead of simply listing headings of different levels we recommend to let every heading be followed by at least a short passage of text. Further on please use the  $\LaTeX$  automatism for all your cross-references and citations as has already been described in Sect. B.2.

Please do not use quotation marks when quoting texts! Simply use the `quotation` environment – it will automatically be rendered in the preferred layout.

#### B.2.1.1 Subsubsection Heading

Instead of simply listing headings of different levels we recommend to let every heading be followed by at least a short passage of text. Furtheron please use the  $\LaTeX$  automatism for all your cross-references and citations as has already been described in Sect. B.2.1, see also Fig. B.1<sup>2</sup>

Please note that the first line of text that follows a heading is not indented, whereas the first lines of all subsequent paragraphs are.

#### Paragraph Heading

Instead of simply listing headings of different levels we recommend to let every heading be followed by at least a short passage of text. Furtheron please use the  $\LaTeX$  automatism for all your cross-references and citations as has already been described in Sect. B.2.

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<sup>1</sup> In physics texts please activate the class option `vecphys` to depict your vectors in ***boldface-italic*** type - as is customary for a wide range of physical subjects.

<sup>2</sup> If you copy text passages, figures, or tables from other works, you must obtain *permission* from the copyright holder (usually the original publisher). Please enclose the signed permission with the manuscript. The sources must be acknowledged either in the captions, as footnotes or in a separate section of the book.

Please note that the first line of text that follows a heading is not indented, whereas the first lines of all subsequent paragraphs are.

For typesetting numbered lists we recommend to use the `enumerate` environment – it will automatically render Springer’s preferred layout.

1. Livelihood and survival mobility are oftentimes coutcomes of uneven socioeconomic development.
  - a. Livelihood and survival mobility are oftentimes coutcomes of uneven socioeconomic development.
  - b. Livelihood and survival mobility are oftentimes coutcomes of uneven socioeconomic development.
2. Livelihood and survival mobility are oftentimes coutcomes of uneven socioeconomic development.

### *Subparagraph Heading*

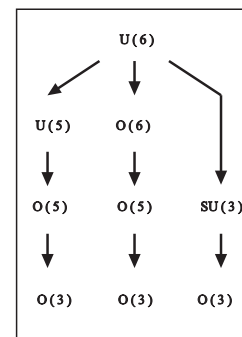
In order to avoid simply listing headings of different levels we recommend to let every heading be followed by at least a short passage of text. Use the  $\LaTeX$  automatism for all your cross-references and citations as has already been described in Sect. B.2, see also Fig. B.2.

Please note that the first line of text that follows a heading is not indented, whereas the first lines of all subsequent paragraphs are.

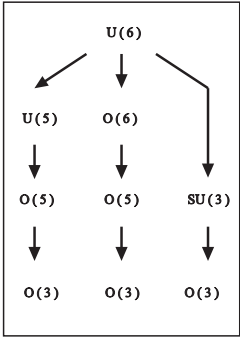
For unnumbered list we recommend to use the `itemize` environment – it will automatically render Springer’s preferred layout.

- Livelihood and survival mobility are oftentimes coutcomes of uneven socioeconomic development, cf. Table B.1.
  - Livelihood and survival mobility are oftentimes coutcomes of uneven socioeconomic development.
  - Livelihood and survival mobility are oftentimes coutcomes of uneven socioeconomic development.

**Fig. B.1** If the width of the figure is less than 7.8 cm use the `sidecaption` command to flush the caption on the left side of the page. If the figure is positioned at the top of the page, align the sidecaption with the top of the figure – to achieve this you simply need to use the optional argument `[t]` with the `sidecaption` command



**Fig. B.2** Please write your figure caption here



**Table B.1** Please write your table caption here

| Classes     | Subclass          | Length     | Action Mechanism                      |
|-------------|-------------------|------------|---------------------------------------|
| Translation | mRNA <sup>a</sup> | 22 (19–25) | Translation repression, mRNA cleavage |
| Translation | mRNA cleavage     | 21         | mRNA cleavage                         |
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<sup>a</sup> Table foot note (with superscript)

- Livelihood and survival mobility are oftentimes coutcomes of uneven socioeco-  
nomic development.

**Run-in Heading Boldface Version** Use the  $\LaTeX$  automatism for all your cross-  
references and citations as has already been described in Sect. B.2.

**Run-in Heading Boldface and Italic Version** Use the  $\LaTeX$  automatism for all your  
cross-references and citations as has already been described in Sect. B.2.

**Run-in Heading Displayed Version**

Use the  $\LaTeX$  automatism for all your cross-references and citations as has already  
been described in Sect. B.2.

### B.3 Section Heading

Instead of simply listing headings of different levels we recommend to let every  
heading be followed by at least a short passage of text. Furtheron please use the  
 $\LaTeX$  automatism for all your cross-references and citations as has already been  
described in Sect. B.2.

Please note that the first line of text that follows a heading is not indented, whereas  
the first lines of all subsequent paragraphs are.



If you want to list definitions or the like we recommend to use the Springer-enhanced `description` environment – it will automatically render Springer’s preferred layout.

- Type 1 That addresses central themes pertaining to migration, health, and disease. In Sect. B.1, Wilson discusses the role of human migration in infectious disease distributions and patterns.
- Type 2 That addresses central themes pertaining to migration, health, and disease. In Sect. B.2.1, Wilson discusses the role of human migration in infectious disease distributions and patterns.

### B.3.1 Subsection Heading

In order to avoid simply listing headings of different levels we recommend to let every heading be followed by at least a short passage of text. Use the  $\LaTeX$  automatism for all your cross-references and citations as has already been described in Sect. B.2.

Please note that the first line of text that follows a heading is not indented, whereas the first lines of all subsequent paragraphs are.

If you want to emphasize complete paragraphs of texts we recommend to use the newly defined Springer class option `graybox` and the newly defined environment `svgraybox`. This will produce a 15 percent screened box ‘behind’ your text.

If you want to emphasize complete paragraphs of texts we recommend to use the newly defined Springer class option and environment `svgraybox`. This will produce a 15 percent screened box ‘behind’ your text.

#### B.3.1.1 Subsubsection Heading

Instead of simply listing headings of different levels we recommend to let every heading be followed by at least a short passage of text. Furtheron please use the  $\LaTeX$  automatism for all your cross-references and citations as has already been described in Sect. B.2.

Please note that the first line of text that follows a heading is not indented, whereas the first lines of all subsequent paragraphs are.

**Theorem B.1** *Theorem text goes here.*

**Definition B.1** Definition text goes here.

**Proof** Proof text goes here.

□

## Paragraph Heading

Instead of simply listing headings of different levels we recommend to let every heading be followed by at least a short passage of text. Furtheron please use the  $\LaTeX$  automatism for all your cross-references and citations as has already been described in Sect. B.2.

Note that the first line of text that follows a heading is not indented, whereas the first lines of all subsequent paragraphs are.

**Theorem B.2** *Theorem text goes here.*

**Definition B.2** Definition text goes here.

**Proof** Proof text goes here. □

### Trailer Head

If you want to emphasize complete paragraphs of texts in an **Trailer Head** we recommend to use

```
\begin{trailer}{Trailer Head}
...
\end{trailer}
```

---

### ? Questions

If you want to emphasize complete paragraphs of texts in an **Questions** we recommend to use

```
\begin{question}{Questions}
...
\end{question}
```

---

### > Important

If you want to emphasize complete paragraphs of texts in an **Important** we recommend to use

```
\begin{important}{Important}
...
\end{important}
```

---

**! Attention**

If you want to emphasize complete paragraphs of texts in an **Attention** we recommend to use

```
\begin{warning}{Attention}
...
\end{warning}
```

---

**Program Code**

If you want to emphasize complete paragraphs of texts in an **Program Code** we recommend to use

```
\begin{programcode}{Program Code}
\begin{verbatim}...\end{verbatim}
\end{programcode}
```

---

**Tips**

If you want to emphasize complete paragraphs of texts in an **Tips** we recommend to use

```
\begin{tips}{Tips}
...
\end{tips}
```

---

**Overview**

If you want to emphasize complete paragraphs of texts in an **Overview** we recommend to use

```
\begin{overview}{Overview}
...
\end{overview}
```

---

### Background Information

If you want to emphasize complete paragraphs of texts in an **Background Information** we recommend to use

```
\begin{backgroundinformation}{Background Information}
...
\end{backgroundinformation}
```

---

### Legal Text

If you want to emphasize complete paragraphs of texts in an **Legal Text** we recommend to use

```
\begin{legalttext}{Legal Text}
...
\end{legalttext}
```

---

**Acknowledgements** If you want to include acknowledgments of assistance and the like at the end of an individual chapter please use the `acknowledgement` environment – it will automatically render Springer’s preferred layout.

## Appendix

When placed at the end of a chapter or contribution (as opposed to at the end of the book), the numbering of tables, figures, and equations in the appendix section continues on from that in the main text. Hence please *do not* use the `appendix` command when writing an appendix at the end of your chapter or contribution. If there is only one the appendix is designated “Appendix”, or “Appendix 1”, or “Appendix 2”, etc. if there is more than one.

$$a \times b = c \tag{B.4}$$

## Problems

**B.1** A given problem or Exercise is described here. The problem is described here. The problem is described here.

### B.2 Problem Heading

- (a) The first part of the problem is described here.
- (b) The second part of the problem is described here.

## **References**



# Glossary

Use the template *glossary.tex* together with the Springer document class SVMono (monograph-type books) or SVMult (edited books) to style your glossary in the Springer layout.

**glossary term** Write here the description of the glossary term. Write here the description of the glossary term. Write here the description of the glossary term.

**glossary term** Write here the description of the glossary term. Write here the description of the glossary term. Write here the description of the glossary term.

**glossary term** Write here the description of the glossary term. Write here the description of the glossary term. Write here the description of the glossary term.

**glossary term** Write here the description of the glossary term. Write here the description of the glossary term. Write here the description of the glossary term.

**glossary term** Write here the description of the glossary term. Write here the description of the glossary term. Write here the description of the glossary term.





# **Solutions**

## **Problems of Chapter B**

**B.1** The solution is revealed here.

### **B.2 Problem Heading**

- (a) The solution of first part is revealed here.
- (b) The solution of second part is revealed here.



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