

**Title of your thesis**

**Bachelor-Arbeit**

zur Erlangung des Grades

**Bachelor of Science (B.Sc.)**

**im Studiengang Mathematik**

am Department Mathematik der  
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von **Your Name**

Betreuer: Prof. A

Betreuer: Dr. B

Betreuer: MSc. C

# 1

## The first Chapter

### 1.1 A

Let us begin with some basic definitions.

**DEFINITION 1.1.** *s*

We'll this obviously leads to the following.

**THEOREM 1.2 (MUCH WOW RESULT).** *I'm one heckin pretty result! You gotta admit that right?*  
*Look an equation*

$$a^2 + b^2 = c^2.$$

Wow i have so much to say.

State  
what  
that  
would  
actual-  
ly be!

*1.2 B*

## **1.2 B**

Hello

## **1.3 C**

This is pretty cool section.

### *1.3 C*

Do you like lewis huey and the news?

# 2

## How to do math

This chapter is dedicated to the functionality of the template concerning its actual and inherent purpose: mathematics. We use material from [1] to showcase the possibilities.

### 2.1 Theorems and Referencing

In this section the term *theorem* does not only refer to a theorem in a mathematical sense, but in fact to definitions, lemmata, examples, remarks, etc., i.e. the environments you usually need to write a math thesis and want to follow some consistent numbering scheme. The package used for theorem numbering and styling is `tcolorbox`, which offers a modern and versatile way to create nice boxes around your theorems, while providing the full functionality of the more traditional `amsthm` package. The necessary commands for theorems are defined in the file `styles/fau-appearance.sty`, so you do not have to worry about that (unless you want to). Hence, we will not fully explain how to define these commands, but we will showcase how to use them. The following code snippet

```
\begin{theorem}{Euler 1763}{fermat}  
Here could be your result.  
\end{theorem}
```

will result in the output

**THEOREM 2.1 (Euler 1763).** *Here could be your result.*

The number of the theorem is assigned automatically. The second argument defines the theorem addition as displayed above and the third argument defines the name of the label that is used to reference [Theorem 2.1](#). While `LATEX` provides the basic commands for cross-referencing, the use of `tcolorbox` suggests to employ `cleveref` package that enhances some of the basic features and is indeed very clever. The above reference was defined by the command

```
\cref{thm:fermat}
```

where the prefix `thm:` was defined in the `tcolorbox` settings. The following environment prefix combinations are provided by `styles/fau-appearance.sty`:

- theorem - `thm`,
- definiton - `def`,
- lemma - `lem`,

## 2.2 Lists and Enumerations

- corollary - cor,
- remark - rem.

The actual appearance of the theorem can be specified by the packet option `thmboxing` for `fau-appearance.sty`, for example

```
\usepackage[thmboxing=thmstyle_plain]{styles/fau-appearance}.
```

is used to create the document you are reading right now. It is currently not supported to simply add custom box styles. If you don't want to use the solutions provided by `fau-appearance.sty` use the `thmcust` option

```
\usepackage[thmcust]{styles/fau-appearance}
```

which will not define any theorem environments.

The `cleveref` links are preset such that link labels are capitalized and carry the link in them. The link colours are set via the `hyperref` package and follow the defined colour scheme. This can be customized globally by

```
\hypersetup{
  urlcolor=blue,
  citecolor=red,
  linkcolor=green}
```

but also locally for each link.

showcase  
some  
of the  
boxes  
we  
provide

## 2.2 Lists and Enumerations

Another key feature you may want to use inside your thesis are lists and enumerations. In  $\text{\LaTeX}$  you can simple use the `itemize` environment like this

### Listing 1: Itemize

```
\begin{itemize}
\item The first item,
\item[$\circ$] a second item with a different bullet type.
\end{itemize}
```

- The first item,
- a second item with a different bullet type.

For enumerations we use the `enumitem` package, that provides vast options for customization. Take a look at the following definition taken from [1],

## 2.3 B

**DEFINITION 2.2.** A mapping  $\mu : 2^X \rightarrow [0, \infty]$  is called a **measure** on the nonempty set  $X$  provided

(i)  $\mu(\emptyset) = 0$  and

(ii) if

$$A \subset \bigcup_{k \in \mathbb{N}} A_k,$$

then

$$\mu(A) \leq \sum_{k \in \mathbb{N}} \mu(A_k).$$

We can reference single items of an enumeration, for example concerning [Definition 2.2](#) we can add the information that [Item 2.2\(ii\)](#) is called subadditivity. The code that produces this enumeration looks like this:

### Listing 2: Enumerate

```
\begin{enumerate}[roman, ref=\thetcbcounter (\roman*)]
\item ... % first item
\item\label{en:subadd} ... % second item
\end{enumerate}
```

The option `roman` is a preset from `fau-appearance.sty` but you can use any valid style provided by `enumitem` itself or define one yourself. The argument `ref=\thetcbcounter (\roman*)` specifies how the label for the reference of this item should be displayed, where `\thetcbcounter` refers to the number of the theorem an enumeration was defined in, thus `\cref{en:subadd}` results in [Item 2.2\(ii\)](#) instead of [Item \(ii\)](#). An enumeration outside of a theorem has to use a different argument for referencing.

### Listing 3: Enumerate

```
\begin{enumerate}[label=(K\theenumi), ref=MyEnum (K\theenumi)]
\item ... % first item
\item\label{en:second} ... % second item
\end{enumerate}
```

(K1) ...

(K2) ...

Here the reference look like this, [Item MyEnum \(K2\)](#).

## 2.3 B

Hello

*2.4 C*

## **2.4 C**

This is pretty cool section.



## *Books*

Do you like lewis huey and the news?

## **Books**

- [1] L. C. Evans. *Measure Theory and Fine Properties of Functions, Revised Edition (Textbooks in Mathematics)*. Chapman und Hall/CRC, Apr. 2015.