Package ethuebung for ETH Exercise Sheets — User's Manual

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This package provides a unified way of typing exercises for ETH Zurich. While you type in logically all aspects of your exercise using provided LaTeX macros (title, text, hints, solution, etc.), it is rendered according to some standard style (yet remaining highly customizable), and provides different versions of the sheet for distributing to students (without the solutions), or for TA's (with solutions). Tips sheets can also be generated.

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1 Getting Started

1.1 Installation

The simplest way of installing the `ethuebung` package is to copy the `ethuebung.sty` file at the same location as your exercise sheet LaTeX file. This requires of course making several copies of the file if needed. A cleaner installation is to place the `ethuebung.sty` file somewhere in your `$TEXINPUTS` environment path.

Note that no other file is needed. The ETH logo is embedded into the style file.

1.2 Minimal Template

Here is a minimal template for an exercise sheet.

```
\documentclass[11pt,a4paper]{article}

\usepackage{ethuebung} % comment this and uncomment next line for solutions
%\usepackage[sol]{ethuebung} % uncomment for solutions

\UebungLecture{Microstructures of molten cheese.}
\UebungProf{Prof. Zebigboss}
\UebungSemester{HS 2999}

\UebungsblattNumber{1}

\begin{document}
\MakeUebungHeader

\exercise{Title of the exercise.}
\keywords{Stern-Gerlach, spin, quantum measurement}

In this exercise, you will be asked to do some work.
```

```
\begin{exenumerate}
\item Solve the following equation.
    \begin{align}
        x^2 = 1\ .
    \end{align}
    \hint{There might be more than one solution.}

    \begin{solution}
        Write here the solution to this exercise.
    \end{solution}
\end{exenumerate}

\end{document}
```

1.3 What This Package Does

This package provides a unified way of typing exercises for ETH Zurich. While you type in logically all aspects of your exercise in a single file using provided LaTeX macros (title, text, hints, exercise, solution, etc.), it is rendered according to some standard style (yet remaining highly customizable), and provides different PDF versions of the sheet for distributing to students (without the solutions), or for TA's (with solutions). Tips sheets can also be generated.

The exercise numbering is taken care of automatically and the equations are given different prefixes depending on whether they are part of the exercise main text, the solution or in a tip block. The page margins are adapted. Exercise part numbering is done smartly and can be resumed, solutions may be attached as external PDF files (e.g., for scanned hand-written solutions) and almost every aspect of the sheet can be customized.

Read on to learn more!

Any questions, suggestions or comments are welcome at `pfaist@ethz.ch`.

2 Setting Up The Exercise Sheet

2.1 Lecture, Lecturer, Semester

Setting up the exercise sheet is just a matter of calling a small number of commands before the beginning of your document, in the preamble. See the template given in Sec. 1.2. These lines could be for example:

```
\UebungLecture{Microstructures of molten cheese.}
\UebungProf{Prof. Zebigboss}
```

```
\UebungProf{Prof. Zebigchef}
\UebungSemester{HS 2999}

\UebungsblattNumber{1}
```

`\UebungLecture{...}` This command sets the title of your lecture to the given argument. The lecture title is displayed in the main exercise header.

`\UebungProf{...}` Use this command to set the professor or lecturer of the course to the given argument. Use this command more than once to specify multiple professors on separate lines.

The `\UebungProf` command, unlike the other commands, appends its value to previously specified values, allowing to specify more than one lecturer. Each lecturer displayed in the header is placed on a new line.

`\UebungLecturer{...}` This command is an exact alias of `\UebungProf`.

`\UebungSemester{...}` This command sets the semester that will be displayed in the header.

`\UebungsblattNumber{...}` This sets the exercise sheet number to the given argument. The exercise sheet number usually starts at 1, and increases every week as more exercise sheets are distributed.
The macro `\theUebungsblattNumber` is defined to expand to the given exercise sheet number.

`\UebungDueBy` Use this command to specify a date by which the sheet should be handed in. For example `\UebungDueBy{21.12.2012}`. This will be displayed by default under the header, aligned right, with a "Due by:" label ("Abgabe:" in German).

These commands should be called in the preamble, but they just internally expand to an internal macro definition. So technically they can be called whenever you want. Just call them before calling any other macro that actually uses those values, e.g. `\MakeUebungHeader` (p. 5). Calling such a macro a second time with a different value overrides the previous value.

`\theUebungsblattNumber` This macro expands to the current exercise sheet number. Set this macro by calling `\UebungsblattNumber`.
You may use this macro anywhere in your document.

2.2 Exercise Sheet Header

The page header is generated automatically by the package and is displayed by calling the `\MakeUebungHeader` command at the beginning of the document.

`\MakeUebungHeader` Draws the main header of the exercise sheet, in three parts, with ETH logo, centered title, and professor/semester displayed on the right. And a horizontal line under those.

The header automatically displays the right title, according to whether the exercise sheet without the solutions or with the solutions is displayed, respectively printing "Series" or "Solutions". The appropriate titles are also automatically displayed in German when the `deutsch` package option is provided.

If you want to display some other string, like "Exercise Sheet", this title can be customized using commands `\UebungsblattTitleSeries` (p. 20) and `\UebungsblattTitleSolutions` (p. 20). The font can also be changed, use `\UebungsblattTitleFont` (p. 20).

The header itself is highly customizable, see Sec. 6.1. If you wish to display a completely different header, or with a very different layout, you may write your code at the beginning of your document and simply not call `\MakeUebungHeader` (p. 5) at all. You may also write a custom style (see section 6.5). In any case please consider **contacting me** if you think your header might be useful to others, so that I can add it as a style in the package.

2.3 Exercise Sheet Language: German or English

```
\usepackage[deutsch]{ethuebung} % German version, "Uebungsblatt"
```

will provide you the German version of the exercise sheet. Simply adding the `sol` package option will provide you the "Musterlösung":

```
\usepackage[deutsch,sol]{ethuebung} % German verion, "Musterloesung"
```

This package option does nothing else than redefining (re-customizing) the sheet title for exercises and for solutions, the exercise label using the commands `\UebungsblattTitleSeries` (p. 20) etc. documented in section 6. It also automatically includes the LaTeX `babel` package with the `[german]` option.

`\UebungLanguage{...}` Set the language of the sheet to the given language. This may be (currently) `English` or `Deutsch`. This will also load the `babel` package. This has the same effect as passing the `[deutsch]` or `[english]` package options.

If you do not wish to load the `babel` package at all, use the `[nobabel]` package option.

3 Exercises

3.1 A new exercise: `\uebung`

Use `\uebung` or `\exercise` to introduce a new exercise, and specify a title for your exercise.

`\uebung{⟨Exercise Title⟩}` Similar to a LaTeX `\section` command, this command starts the definition of a new exercise. The exercises are automatically numbered. An adequate label is displayed with the current exercise number, and the exercise title is printed in bold italic font (by default).

`\uebung{⟨Exercise Title⟩}[⟨annotation⟩]` This syntax behaves exactly like the `\uebung{...}` command, and adds an extra annotation to the exercise. This can be used, for example, to specify how many points are awarded for successfully solving the exercise, or to indicate some additional information for the exercise.
Example: `\uebung{Postulates of Quantum Mechanics}[3 points]`

The exercise is internally implemented as a LaTeX `\paragraph`. The numbering is taken care of by an internal counter (`uebcounter`).

The label and title font of the exercise can be highly customized by using or redefining for example the commands `\UebungLabel` (p. 22), `\UebungExTitleFont` (p. 21), `\theuebcounter` (p. 25), `\uebExerciseAnnotation` (p. 26), etc.

`\exercise{...}` Exactly the same as `\uebung`.

Commands `\uebung` and `\exercise` produce exactly the same output, in the same language, which is the language of the sheet. By default, the language is English, but it can be changed to German by specifying the `[deutsch]` package option.
The label can also independently be changed, see `\UebungLabel` (p. 22).

You should add keywords to the exercise with the `\keywords` command. Separate keywords by commas. These keywords will not appear in the PDF file, but can be helpful to search for exercises afterwards, by scanning through the LaTeX exercise sheet files.

```
\exercise{State Tomography of a Coin.}
\keywords{tomography, coin, coin bias, maximum likelihood, Bloch sphere}
```

`\keywords{keyword1, keyword2, ...}` Add keywords to an exercise. This command expands to nothing, i.e. the keywords will not be visible in the compiled exercise, tips or solutions sheet. However, they can prove useful to search for exercises afterwards by scanning through the LaTeX files.

3.2 The `\begin{exenumerate}...\end{exenumerate}` environment

`\begin{exenumerate} ... \end{exenumerate}`
This environment provides a `enumerate`-like environment, with labels (a), (b), ... by default, with which you can split an exercise into several parts. Use `\item` for each part, as for `itemize` and `enumerate`.

Such `\begin{exenumerate}...\end{exenumerate}` environments can be nested up to two levels (by default), and the second level will be numbered (by default) (i), (ii), ...

These environments may be broken and resumed, and their numbering will be automatically resumed correctly and reset for each exercise. This is useful to add comments or to introduce new concepts between different parts of an exercise.

For example:

```
Consider the setting in which one applies a positive voltage between
the source and the gate leeds. Answer the following questions.
\begin{exenumerate}
\item % This is (a)
    Calculate quantity blah blah for this setting.

\item % This is (b)
    What happens at the edge of the sample with this setting?

\end{exenumerate}

Now, consider setting a {\em negative} voltage instead.
\begin{exenumerate}
\item % This item will automatically be labelled (c).
    Recalculate the quantity blah blah for this setting.

\end{exenumerate}
```

Last but not least, you can refer to different parts of the exercise with LaTeX's usual `\label{...}` and `\ref{...}` commands, as for example:

```
\begin{exenumerate}
\item % This is item (a)
    \label{expart:FirstQuestion}
    Prove Fermat's big theorem.

\item % This is item (b)
    Convince yourself that question~\ref{expart:FirstQuestion} is
    quite difficult.
    % this will display "Convince yourself that question (a) ..."
```

```
\end{exenumerate}
```

You may change the default labelling, (a), (b), ..., by specifying your label format as `\begin{exenumerate}[format]`, for example:

```
\begin{exenumerate}[A)]
\item This is A)
\item This is B)
\end{exenumerate}
```

The syntax is the one used by the `\begin{enumerate}`...`\end{enumerate}` environment (in the `enumerate`[1] package, or in the `enumitem`[2] package with `shortlabels` options).

Internally the package `enumitem` is used, with option `shortlabels`. This allows the use as described above of the (old) `enumerate` syntax, as well as the new (but unfortunately more cryptic and verbose) `enumitem` syntax, `[label=(\roman*)]`.
See section 6.2 for commands available to customize the `\begin{exenumerate}`...`\end{exenumerate}` environment, in particular `\UebungLabelEnum`.

You may of couse use usual LaTeX cross-referencing for referring to other exercise parts. It suffices to use a `\label` at the exercise part you want to refer to, and then refer to that exercise part with a usual `\ref` command. This package also provides the command `\exenumfulllabel`, which can be used instead of `\label` if you want the reference to contain both levels of exercise parts in case of nested enumeration. An example usage of these commands:

```
\begin{exenumerate}
\item \label{expart:A} This is exercise part (a).
\item \label{expart:B} This is exercise part (b), that follows exercise
  part~\ref{expart:A}.
  \begin{exenumerate}
  \item \label{expart:Bi}
    This is exercise sub-part (i) to exercise part (b).
  \item \exenumfulllabel{expart:myfullreferenceToBii}
    \label{expart:simpleRefToBii}
    This is exercise sub-part (ii) to exercise part (b).
  \item \exenumfulllabel{expart:Biii}
    This is exercise sub-part (iii) to exercise part (b).
```

[1] http://mirrors.ctan.org/macros/latex/required/tools/enumerate.pdf
[2] http://mirrors.ctan.org/macros/latex/contrib/enumitem/enumitem.pdf

```
  \end{exenumerate}
\end{exenumerate}

You can now refer to exercise part~\ref{expart:B} ``(b)'', to exercise
part~\ref{expart:Bi} ``(i)'', to exercise part~\ref{expart:simpleRefToBii}
``(ii)'', or exercise part~\ref{expart:myfullreferenceToBii} ``(b) (ii)'',
or exercise part~\ref{expart:Biii} ``(b) (iii)''.
```

Note that you can put the name you wish inside `\label` and `\exenumfulllabel`, and you can combine these as you wish.

In case you may wish to manually reset the `exenumerate` counter back to zero instead of having it resume on the next occurence of `\begin{exenumerate}...\end{exenumerate}`, use the command `\exenumeratereset`. This should normally not be needed, but the command is provided in case you would need it. The numbering is anyway automatically reset to zero for new exercises (i.e., upon each `\uebung` (p. 6) and `\subuebung` (p. 11)), and in `\begin{loesung}...\end{loesung}` (p. 14) environments that are not themselves inside an outer `\begin{exenumerate}...\end{exenumerate}` environment.

`\exenumeratereset` Manually reset the numbering of the exenumerate environment to zero. The next occurrence of `\begin{exenumerate}...\end{exenumerate}` will start again from "(a)" (or whatever the label was redefined to be).

3.3 Hints

Hints can be introduced with the `\hint` and `\hints` commands.

`\hint{...}` Displays some text meant as a hint to the student with a label "Hint". A special font is used (e.g. small and italic)

`\hints{...}` Same as `\hint`, except uses the label "Hints". Use this when several hints are given at once.

For example:

```
\hint{Remember that a unitary $U$ satisfies
    $UU^\dagger=U^\dagger U=\mathbb{I}$.}
```

or, if there are several hints,

```
\hints{Remember that a unitary $U$ satisfies
    $UU^\dagger=U^\dagger U=\mathbb{I}$.

    Also, a rotation $R$ satisfies $RR^T=R^T R=\mathbb{I}$.
}
```

You can customize the appearance of the hint text, as well as the label used for hints with the `\UebungHinweisLabel` (p. 22), `\UebungHinweiseLabel` (p. 23), and the `\UebungHinweisFont` (p. 21) commands.

`\hinweis{...}` This is exactly the same as `\hint`.

`\hinweise{...}` This is exactly the same as `\hints`.

Both `\hinweis` and `\hint` produce the same output in the same language, which is the language of the sheet (English by default, or German if the `deutsch` package option was given).

3.4 Splitting exercises into 'Sub-Exercises'

You can split exercises into sub-exercises, in the same spirit as when in a regular LaTeX article you split `\section`'s into `\subsection`'s.

`\subuebung{...}` Define a sub-exercise, the title of which will be the argument given. This will number the sub-exercise automatically.

`\subexercise{...}` Exactly the same as `\subuebung`

The following example:

```
\exercise{Quantization of the Electromagnetic Field.}
\keywords{electromagnetic field, second quantization, quantum fields}
In this exercise, we will learn to quantize the electromagnetic field.
```

```
\subexercise{Classical Case.}
First, here are some questions about classical E-M fields...

...

\subexercise{Quantum Case.}
Now we will quantize the E-M field...

...
```

will appear as:

Exercise N. ***Quantization of the Electromagnetic Field.***
In this exercise ....
...
N.1 ***Classical Case.*** First, here are ...
...
N.2 ***Quantum Case.*** Now we ...
...

Leaving an extra (blank) newline between `\subexercise` and the sub-exercise text will produce the sub-exercise text on a new line.

Of course, `\subexercise` is customizable, too. See section 6.2.

3.5 Note About Figures

The most convenient way to insert a figure in an exercise sheet is to use `\includegraphics`. The package `graphicx` is already included by default by `ethuebung`. For example, if you have a file named `my_figure.pdf` in the `figures` subdirectory:

```
\begin{center}
\includegraphics[width=7cm]{figures/my_figure}
\end{center}
```

More documentation is available here[3].

The usual `\begin{figure}...\end{figure}` environment can also be used, although the figure placement is then more difficult to control and usually ends up using up lots of space and cluttering the exercise sheet.

A neater solution is to have a figure alongside the main text. For that you may use the `\begin{wrapfigure}...\end{wrapfigure}` environment (in the `wrapfig`[4] package, pretty good documentation here[5]). For example:

```
\begin{wrapfigure}{r}{50mm}
  \centering
  \includegraphics[width=45mm]{fig/DoubleUPotential}
\end{wrapfigure}
```

There is a demo file with examples on how to use figures, called `figures.tex`, inside the `demo` directory in the `ethuebung` repository.

4 Solutions and Tips Sheets

The package `ethuebung` allows for the same LaTeX file to generate also the solutions and tips sheet.

You should write up the solutions for an exercise immedately after the exercise, or between exercise parts, using a `\begin{loesung}...\end{loesung}` environment. When the sheet is compiled in "exercise sheet" mode (the default), then the solutions are simply ignored and not displayed. However, when the package option `sol` is provided, or if the command `\UebungMakeSolutionsSheet` (p. 14) has been called, then whenever the environment `\begin{loesung}...\end{loesung}` is encountered, a label "Solution" is printed, followed by the contents of the environment. By default, the solution text is printed in a smaller font to make it visually clear that it is the solution to the exercise. The same concept applies for the tips sheet.

Formatting of the solutions takes care, too, of numbering the equations differently (i.e. (S.1), (S.2), etc.) so equation numbering does not collide with the equation text. Equations in the main text are also guaranteed to have the same labels between the exercise, solution and tips versions of the sheet.

[3] http://en.wikibooks.org/wiki/LaTeX/Importing_Graphics

[4] http://texdoc.net/texmf-dist/doc/latex/wrapfig/wrapfig-doc.pdf

[5] http://en.wikibooks.org/wiki/LaTeX/Floats,_Figures_and_Captions#Wrapping_text_around_figures

4.1 Generating the Solutions Sheet

There are three independent ways of telling `ethuebung` to generate a solutions sheet with all solutions displayed.

- use the package option `[sol]`;
- use the command `\UebungMakeSolutionsSheet`;
- use the provided script `pdflatexsol`.

As shown in the minimal template in section 1.2, one may tell `ethuebung` to generate a solutions sheet by adding the `[sol]` package option. This means that the command

```
\usepackage[sol]{ethuebung}
```

will include the `ethuebung` package in solution sheet mode, whereas the command

```
\usepackage{ethuebung}
```

will generate an exercise sheet with all solutions hidden.

Alternatively, one may omit the `[sol]` the package option, and invoke the `\UebungMakeSolutionsSheet` command instead. This command should be placed in the preamble, before `\begin{document}`.

`\UebungMakeSolutionsSheet` This command has exactly the same effect as providing the `sol` package option. It switches the sheet to "solutions" mode, giving it a "Solutions" title, and displaying all contents provided in `\begin{loesung}...\end{loesung}` environments and `\pdfsolution` (p. 16) commands.

As a third solution, you may use the script `pdflatexsol` (see section 7). The LaTeX file should be prepared as for generating the exercise sheet, i.e. without the `[sol]` package option and without any call to `\UebungMakeSolutionsSheet`. Then the solution PDF, with a standard extension `*_sol.pdf`, can be generated with the shell command

```
> pdflatexsol qit11-ex06.tex
```

whereas the exercise sheet can be generated with either the usual `pdflatex` or with `pdflatexex`.

4.2 Inline Solutions for Solutions Sheet: `\begin{loesung}...\end{loesung}`

Use the `\begin{loesung}...\end{loesung}` environment to write the solutions to each exercise inline, right after the exercise main text. The `\begin{loesung}...\end{loesung}` environment may appear anywhere in the exercise, and may be repeated. You may have, for example, one general solution at the end of the exercise, or multiple solutions after each exercise part or sub-exercise.

`\begin{loesung} ... \end{loesung}`

Provides solution text to an exercise. The content of this environment is by default hidden, unless in 'solution sheet' mode (package option `sol`, or with the command `\UebungMakeSolutionsSheet` (p. 14)). If in solution sheet mode, then the contents is formatted using a smaller font (by default) and is preceeded by the label "Solution" (or "Lösung" if the sheet is in german, with the `deutsch` package option, see Sec.2.3).
Equations numbered within this environment obey a separate counter and their labels are preceeded by a letter "S" (resp. "L" in German), i.e. (S.1), (S.2), ... (resp. (L.1), (L.2), ...), such that it is guaranteed that equation numbering stays consistent between solution sheet mode and exercise sheet mode.

`\begin{solution} ... \end{solution}`

Exactly the same as the `\begin{loesung}...\end{loesung}` environment.

Both commands `\begin{loesung}...\end{loesung}` and `\begin{solution}...\end{solution}` display their label in the same language, which is the language of the exercise sheet. This defaults to English but may be set to German with the `deutsch` package option (Sec. 2.3).

4.3 PDF Attachment as solution

It is also possible to attach a PDF file with, for example, a scanned hand-written solution. The pages of that file are included at the end of the solutions sheet, with a reference to the page number at the point in the exercise where the solution is referenced, and a title superimposed to the included PDF pages that specify which exercise those pages refer to.

For example, if a solution is scanned as `scanned-solution.pdf`, then you can simply write in your exercise:

```
\exercise{A Nice Exercise}
Show that blah blah blah something cool.

\pdfsolution{scanned-solution.pdf}
```

the `\pdfsolution` command internally expands to a `\begin{solution}...\end{solution}` environment at the point where its called, inserting some text like "The solution is provided on page XYZ". Then the pages of the specified PDF are appended at the end of the solutions sheet, with on each page printed on top "Solution to exercise NN".

This works also as inline solutions to sub-exercises and to exercise parts inside an `\begin{exenumerate}...\end{exenumerate}` (p. 8) environment.

Obviously, the command expands to nothing if not in solutions mode, and no PDF pages are included in that case.

The inclusion of the PDF is internally accomplished with the `\includepdf` command from the `pdfpages`[6] package.

`\pdfsolution[options]{pdf file}` Specify a PDF file to include which contain the solution to the current exercise. A reference to the page where the solutions will be inserted (at the end of the sheet) is inserted at the current location within a `\begin{solution}...\end{solution}` (p. 15) environment. The included pdf pages are given a title on each page specifying which exercise they are the solution to. The `options` are any options that can be passed to `\includepdf` of the `pdfpages` package.

`\pdfloesung[options]{pdf file}` Exact same command as `\pdfsolution`.

4.4 Tips Sheet

A tips sheet is meant as a third (of course, optional) sheet which may contain additional background information to the exercises, remind some formulas or some theory, and possibly give some hints on how to start solving the exercise.

A tips sheet is generated very similarly to the solution sheet. The LaTeX code corresponding to tips should be placed in the following environment.

`\begin{tips} ... \end{tips}`
Some tips to be displayed only in tips sheet mode. Analogue of `\begin{loesung}...\end{loesung}` (p. 14), but for tips instead of solutions. The contents of this environment will be displayed only when the tips sheet is being generated. The contents of this environment will be discarded if the exercise sheet or the solutions sheet is being generated.

`\begin{tipps} ... \end{tipps}`
Alias of the above environment.

`\UebungMakeTipsSheet` Analogue of `\UebungMakeSolutionsSheet` (p. 14): this command changes to tips sheet generation mode.

To generate the tips sheet, analogously to the solutions sheet, you may use the `[tips]`

[6] http://mirrors.ctan.org/macros/latex/contrib/pdfpages/pdfpages.pdf

package option:

```
\usepackage[tips]{ethuebung} % Generates tips sheet
```

There are also some additional commands which allow you (again, analogously to the solutions sheet) to customize the appearance and behavior of the tips sheet.

`\UebungTipsFont{...}` Set the font to use in tips environments. Analog of `\UebungLoesungFont` (p. 23).

`\UebungTipsLabel{...}` Sets the text used to label tips paragraph headings. Analog of `\UebungSolLabel` (p. 23).
The default is "Tips." (or in German, "Tipps.").

`\UebungTipsEquationLabel{...}` Specify how to prefix equation labels in tips blocks. Analog of `\UebungSolEquationLabel` (p. 23).
The default is "T."

`\UebungsblattTitleTips{...}` Title of the tips sheet. Analog of `\UebungsblattTitleSolutions` (p. 20).
The default is "Tips." (or, in German, "Tipps.").

4.5 Selectively Output Text Depending on Sheet Type

You may choose to add some additional information, or text, that is to appear only when compiling the solutions sheet, or only when compiling the exercise sheet. Use the following environments and contidionals for this purpose.

`\begin{onlyexercisesheet} ... \end{onlyexercisesheet}`
The contents of this environment will be displayed in normal font, only if the sheet being compiled is the exercise sheet. The contents will be hidden when generating the solutions sheet as well as a tips sheet.

`\begin{onlyuebungsblatt} ... \end{onlyuebungsblatt}`
Alias of the above.

`\begin{onlysolutions} ... \end{onlysolutions}`
The contents of this environment will be displayed only if the solutions sheet is being generated. The contents will be formatted using the default solutions font, as set with `\UebungLoesungFont` (p. 23). The contents will be hidden if the exercise sheet or tips sheet is being generated. The difference with the `\begin{solution}...\end{solution}` (p. 15) environment is that no "Solution." paragraph heading is produced.

`\begin{onlymusterloesung} ... \end{onlymusterloesung}`
Alias of the above.

`\begin{onlytipssheet} ... \end{onlytipssheet}`
The contents of this environment will be displayed only if the tips sheet is being generated. The contents will be formatted using the default tips font, as set with `\UebungTipsFont` (p. 17). The contents will be hidden if the exercise sheet or solutions sheet is being generated. The difference with the `\begin{tips}...\end{tips}` (p. 16) environment is that no "Tips." paragraph heading is produced.

The conditionals can be used to selectively output text. Use the usual TEX construct for "if" conditionals:

```
\ifmusterloseung
  ... % do something on the musterloesung sheet
\else
  ... % do something else on the other sheet(s)
\fi
```

`\ifuebungsblatt` Conditional which is set to TRUE if the exercise sheet is being generated, and FALSE otherwise (solutions sheet or tips sheet).

`\ifmusterloesung` Conditional which is set to TRUE if the solutions sheet is being generated, and FALSE otherwise (exercise sheet or tips sheet).

`\iftipssheet` Conditional which is set to TRUE if the tips sheet is being generated, and FALSE otherwise (exercise sheet or solutions sheet).

5 Exercise Sheet Style

This package provides different exercise sheet *styles*, i.e. ways the sheet look. The default style should usually be sufficient; however you may prefer the appearance provided by other styles.

`\UebungStyle{...}` Sets the style of the exercise sheet to the given named style. This can be for example "`Default`", "`ETHUniZH`", "`LargeSolutions`", "`LargeTips`" or "`PreviousITP`".

The `Default` style changes nothing. It just provides the default style with all the labels and fonts and definitions as defined by the base package implementation.

The `ETHUniZH` style changes the sheet design and puts both the ETH and Uni ZH logos. After calling `\UebungStyle{ETHUniZH}`, some extra new commands are available to set additional settings: `\ETHUNIBesprechung{<ETH>}{<UNI>}` to set the dates the series will be discussed at ETH and at the UNI; `\ETHUNIURL{<URL>}` to set the web page for the course (default empty); and `\ETHUNIInstitut{<Institute>}` to change the institute (default "Institute for Theoretical Physics" or corresponding in German). This style obeys the current sheet language; make sure to call `\UebungLanguage{}` *before* calling `\UebungStyle{ETHUniZH}`, or use the relevant package option.

The `LargeSolutions` and `LargeTips` style makes the exercise text appear italic in the solutions (respectively tips sheet) and keeps the solution text (resp. tips) with a normal font size, instead of the smaller default font size.

The `PreviousITP` style redefines the appearance of the sheet to look like the `exercise.sty` style developed by Christoph Buchendorfer, with a larger title font, bold non italic exercise titles, exercise numbering including the sheet number, etc.

Check out section 6.5 for information on how to define custom styles.

6 Customizing the Exercise Sheet Appearance

In this section we will present some handy commands to change the way the exercise sheet looks, or to change some defaults to some other values you would prefer.

All `\Uebung***{...}` commands specified in this section internally expand to an internal macro definition, and may be called several times if need be (but it shouldn't need be...). Also, best practice is to call them in the preamble, but things will still work if you call them anywhere else before you call any command that actually uses the values you want to set.

6.1 Customizing the Header

`\UebungsblattTitleSeries{...}` Redefines the title of the exercise sheet whenever the sheet is compiled in "exercise" sheet mode. This setting is ignored if the sheet is compiled in "solutions" sheet mode.
Default title is "Series" ("Übungsblatt" in German).

`\UebungsblattTitleSolutions{...}` Redefines the title of the exercise sheet whenever the sheet is compiled in "solutions" mode. This setting is ignored if the sheet is compiled in "exercise sheet" mode.
Default title is "Solutions" ("Musterlösung" in German).

`\uebUebungsBlattTitle` This command expands to either "Series" or "Solutions" (or whatever titles you set with `\UebungsblattTitleSeries` or `\UebungsblattTitleSolutions`), depending on whether the sheet is being compiled in exercise sheet or solutions sheet mode. (Of course, for tips sheets, this is "Tips" or whatever you changed it to). This does not include the series number. This command can be handy if you wish to override uebSerieTitle to remove the numbering in the title.

Both commands `\UebungsblattTitleSeries` and `\UebungsblattTitleSolutions` can be specified in the same preamble. The relevant title depending on exercise or solutions mode is automatically selected.

For special sheets such as "Revision Sheet" or "Midterm Exam", you may use the following commands:

```
% Title of what is handed out to students
\UebungsblattTitleSeries{Midterm Exam.}
% The corresponding solutions sheet title
\UebungsblattTitleSolutions{Midterm Exam: Solutions.}
% Not providing any number removes the number from the title
\UebungsblattNumber{}
```

`\UebungsblattTitleFont{...}` Redefines the commands to set the font for the main title. You may use the usual LaTeX comands to manipulate fonts, `\bfseries`, `\large`, `\Large`, `\fontfamily`, `\fontseries`, `\selectfont` etc. It is also possible to pass the name of a macro that expects an argument, e.g. `\underline`, if nothing else follows that macro.
The default font specification is "`\large\bfseries`".

`\UebungLogoFile{...}` Specify a graphic file with a logo to include instead of the ETH logo. The file must be an acceptable file for `\includegraphics`, e.g. PDF or PNG for `pdf` output or EPS for `dvi` output.
This internally redefines the `\uebHeaderLogo` (p. 26) command for an appropriate call to `\includegraphics`.

`\UebungDueByLabel{...}` Changes the label to display the date by which the exercise sheet is due to the given string. This is by default "Due by" (in German: "Abgabe"). For further customization see `\uebDueBy` (p. 26).

`\UebungTitleCenterVSpacing{...}` Specify some extra spacing that will lift the central title a bit higher vertically with respect to the logo and the lecturer/semester. Set something here if you have e.g. a long lecture name which starts overlapping with the logo.
By default, no spacing is added ("0mm").

6.2 Customizing the Exercise Labels and Fonts

`\UebungHinweisFont{...}` Specify the font commands to use to set up the font for the main text produced by the `\hint` (p. 10) and `\hints` (p. 10) commands.
This command has the same syntax as the `\UebungsblattTitleFont` (p. 20) command.
Default font is "`\small\itshape`".

`\UebungExTitleFont{...}` Specify the font used when displaying the title of an exercise, i.e. the text passed as argument to the `\exercise` (p. 7) command.
This command has the same syntax as the `\UebungsblattTitleFont` (p. 20) command.
Default font is "`\bfseries\itshape`".

`\UebungSubExTitleFont{...}` Specify the font used when displaying the title of a sub-exercise, i.e. the text passed as argument to the `\subexercise` (p. 11) command.
This command has the same syntax as the `\UebungsblattTitleFont` (p. 20) command.
Default font is "`\bfseries\itshape`".

`\UebungLabel{...}` Specify the text to display to label an exercise. This is typically "Exercise" or "Question".
Default value is "Exercise". See also `\uebTheUebungLabel` (p. 25).

`\UebungSubLabel{...}` Specify the text to display to label a sub-exercise.
The default value is empty. See also `\uebTheUebungSubLabel` (p. 25).

`\UebungLabelEnum{...}` Specify the label that will be used for each exercise part (e.g. (a), (b), ...) produced by a `\begin{exenumerate}...\end{exenumerate}` (p. 8) environment. Here you must specify the label with the format for the `enumitem` package, i.e. for example use any string containing one of the `\roman*`, `\Roman*`, `\alph*`, `\Alph*`, or `\arabic*` commands.
The default label definition is "`(\alph*)`".

`\UebungLabelEnumSub{...}` Specify the label that will be used for each nested exercise part, i.e. any `\begin{exenumerate}...\end{exenumerate}` (p. 8) environment nested within another `\begin{exenumerate}...\end{exenumerate}` (p. 8) environment. The default is (i), (ii), ... As for `\UebungLabelEnum`, the format has to be conform to the `enumitem` package.
The default label definition is "`(\roman*)`".

`\UebungHinweisLabel{...}` Specify what text to display to introduce a hint produced by `\hint` (p. 10). You may for example use a colon (':') instead of a period ('.') if you prefer.
Default text is "Hint." ("Hinweis." in German).

`\UebungHinweiseLabel{...}` Specify what text to display to introduce hints produced by `\hints` (p. 10). You may for example use a colon (':') instead of a period ('.') if you prefer.
Default text is "Hints." ("Hinweise." in German).

Note that the same text will be displayed by the `\hint` (p. 10) and `\hinweis` (p. 11) commands regardless of the sheet language setting. That text is the one specified to `\UebungHinweisLabel`. The sheet language setting only changes the default value for the hint label. The same applies to the `\hints` (p. 10) and `\hinweise` (p. 11) commands.
Actually, internally, when the the `[deutsch]` package option is given, a call to `\UebungHinweisLabel` is made to set the German version of the label, to replace the initial English version.

6.3 Customizing the Solutions Labels and Fonts

`\UebungLoesungFont{...}` Specify the font to use for the inline solutions environment `\begin{loesung}...\end{loesung}` (p. 14). The font is a sequence of LaTeX font commands such as `\bfseries`, `\sfshape` etc.
This command has the same syntax as `\UebungsblattTitleFont` (p. 20). However, here you may not specify a command that will take an argument such as `\underline`.

`\UebungSolLabel{...}` Specify the text to display as a label for an inline solution block. This is the label that will be displayed as title of the `\(sub)paragraph` which is induced by a `\begin{loesung}...\end{loesung}` (p. 14) environment.
The default is "Solution." (or in German, "Lösung.").

`\UebungSolEquationLabel{...}` Specify a label that should be used to identify equations that are inside a solutions environment. This text is prepended to the equation number.
The default is "S." (or in German, "L.").

`\UebungAttachedSolutionTitleTop{...}` For pages with solutions included from an external PDF file with `\pdfloesung` (p. 16), you may specify here the spacing between the top of the page and the title which is automatically produced on those pages.
The default value is "`1.3\baselineskip`".

`\UebungAttachedSolutionTitleFont{...}` For pages with solutions included from an external PDF file with `\pdfloesung` (p. 16), specify here the font commands to use to display the title which is automatically produced on those pages.
The syntax is the same as `\UebungsblattTitleFont` (p. 20).
The default value is "`\bfseries\small\underline`".

`\UebungAttachedSolutionTitle{...}` For pages with solutions included from an external PDF file with `\pdfloesung` (p. 16), specify here the title to automatically display on each of those pages.
You may use the special `\uebattachedsolutiontheexercisenumber` command to refer to the exercise for which the current page is the solution.
The default value is "`Solution to Exercise~\uebattachedsolutiontheexercisenumber.`", or, if the sheet is in German, "`L\"osung zu der \"Ubung~\uebattachedsolutiontheexercisenumber.`".

`\UebungTextAttachedSolution{...}` For solutions included from an external PDF file with `\pdfloesung` (p. 16), use this command to specify which text should be displayed at the point where `\pdfloesung` is called, to refer to an attached solution.
You may use the special `\uebthepageattached` command to refer to the page on which the solution is attached.
The default value is "`The solution to this exercise is attached on page \uebthepageattached.`", or, if the sheet is in German, "`Die L\"osung dieser \"Ubung finden Sie im Anhang auf der Seite~\uebthepageattached.`".

6.4 Customizable "Composed" Commands

Some "compositions" can be redefined in order to change the sheet appearance. Use the proper LaTeX syntax for redefining commands, i.e.

```
% Example: remove exercise sheet numbering and final dot
\renewcommand{\uebSerieTitle}{\uebUebungsBlattTitle}
```

`\theuebcounter` This command expands to the current exercise number, formatted in the way we want to display it in the sheet. It is a standard LaTeX counter value like `\thesection`.
The default is simply "`\arabic{uebcounter}`".
You may redefine this command to display the exercise number as you wish.
For example, redefinition .....

`\uebTheUebungLabel` This command expands to the label that should be used as a title for the `\(sub)paragraph` generated by `\uebung` (p. 6). You may redefine this command to some custom value, which will probably refer to the current exercise number, `\theuebcounter`.
The default is:
"`\ueb@maybespaceafter{\ueb@TheUebungLabel}\theuebcounter.`"

`\uebTheUebungSubLabel` Same as `\uebTheUebungLabel`, except that it is used for sub-exercises (`\subuebung`/`\subexercise` (p. 11)).
The relevant counter value is `\thesubuebcounter`, which should be defined normally to also display the main exercise number.
The default is:
"`\ueb@maybespaceafter{\ueb@TheUebungSubLabel}\thesubuebcounter.`"

`\uebExerciseEqLabel` ...
The default is:
"`\arabic{equation}`"

`\uebLoesungEqLabel` ...
The default is:
"`\ueb@TheSolEquationLabel\arabic{uebeqloesung}`"

`\uebTipsEqLabel` ...
The default is:
"`\ueb@TheTipsEquationLabel\arabic{uebeqtips}`"

`\uebHinweisParagraph{...}{...}` ...
The default is:
"`\par {\ueb@TheHinweisFont #1\hspace*{2mm} #2}`"

`\uebSerieTitle` This macro expands to the title of the exercise sheet. This includes the name of the sheet given by `\ueb@UebungsBlattTitle` (e.g. "Series" or "Solutions"), as well as the sheet number.
If the value doesn't refer explicitely to `\UebungsblattTitleSeries` and/or `\UebungsblattTitleSolutions` (e.g. via `\uebUebungsBlattTitle`), then this setting overrides any title set by those commands.
You may for example redefine this macro to completely override the sheet title, e.g.: `\renewcommand{\uebSerieTitle}{Overridden Title.}`
Or, if you simply want to remove completely the sheet number and final dot, `\renewcommand{\uebSerieTitle}{\uebUebungsBlattTitle}`
The default is:
"`\uebUebungsBlattTitle\ueb@maybespace{\theUebungsblattNumber}.`"

`\uebHeaderLogo` Expands to stuff that will be displayed in the logo corner. By default, this command simply expands to `\ETHLogo` (p. 28).

`\uebHeaderCenter` Expands to stuff that will be displayed in the center of the header. Look at `ethuebung.sty` for the default definition.

`\uebHeaderRight` Expands to stuff that will be displayed in the right corner of the header. Look at `ethuebung.sty` for the default definition.

`\uebDueBy` The way the "due by" text will be displayed in the header. NOTE: This is used only if non-empty text was set with `\UebungDueBy` (p. 4), otherwise this is ignored.
The default is:
"`\small \ueb@TheDueByLabel{}: \ueb@TheDueBy`"

`\uebExerciseAnnotation{...}` Formats an exercise annotation (e.g., number of points). (Beware if you're exploiting hacks that this command might be called twice for the same exercise, as it first needs to calculate the width of the annotation in order to decide whether to put it on a new line.)
The default is:
"`\footnotesize\textit{[#1]}`"

The following commands customize some spacing settings. Note that they are defined as LaTeX commands and not lengths. This means that you should redefine them also with `\renewcommand`. Also, you can use for example `\textwidth` which will expand later to the header width:

```
\renewcommand{\uebHeaderLogoWidth}{.15\textwidth}
\renewcommand{\uebHeaderCenterWidth}{.60\textwidth}
\renewcommand{\uebHeaderRightWidth}{.2499\textwidth}
```

`\uebHeaderTopVSpace` ...
The default is:
"`-15mm`"

`\uebHeaderMidVSpace` ...
The default is:
"`2mm`"

`\uebHeaderBelowVSpace` ...
The default is:
"`2mm`"

`\uebHeaderLogoWidth` ...
The default is:
"`.25\textwidth`"

`\uebHeaderCenterWidth` ...
The default is:
"`.50\textwidth`"

`\uebHeaderRightWidth` ...
The default is:
"`.2499\textwidth`"

`\uebLoesungEndVSpace` ...
The default is:
"`3mm`"

`\uebTipsEndVSpace` ...
The default is:
"`3mm`"

Some LaTeX Utilities. Some utilities are defined by this package, which you may use when you redefine commands presented above. All utilities are properly commented inside the source code itself, and only what I think are the two most useful utilities are presented here.

Note that to use these commands in a regular LaTeX file and not a style file, you should enclose your definitions between `\makeatletter` and `\makeatother`, since the command names contain the "`@`" character.

`\ueb@ifnotempty{condition-text}{stuff-if-not-empty}{stuff-if-empty}`
Tests if `condition-text` is empty or not (this checks if the given text generates a zero width box, which is not the same as checking whether a command is defined or not). If the `condition-text` is not empty, then this macro expands to `stuff-if-not-empty`, otherwise expands to `stuff-if-empty`.

`\ueb@maybespace{...}` Expands to the content of the argument preceeded by a nonbreaking space (`~`), except if the contents contains no text, in which case this macro expands to nothing.

`\ueb@maybespaceafter{...}` Same as `\ueb@maybespace`, except that the space is inserted *after* the content if the content is not empty.

`\ETHLogo` Inserts the ETH logo, resized to fit `\textwidth`. Works both for DVI/PS and PDF output by inserting relevant special code directly in raw PS or PDF commands, so that no external figure file is needed. To resize to a specific width, use `\ETHLogo[3cm]`

`\ETHLogoRaw` Inserts the ETH logo at fixed size 100 × 25pt. Works both for DVI/PS and PDF output by inserting relevant special code directly in raw PS or PDF commands, so that no external figure file is needed.

`\UniZHLogo` Inserts the logo of the University of Zurich, resized to fit `\textwidth`. Works both for DVI/PS and PDF output by inserting relevant special code directly in raw PS or PDF commands, so that no external figure file is needed. To resize to a specific width, use `\UniZHLogo[3cm]`

`\UniZHLogoRaw` Inserts the logo of the University of Zurich at fixed size 25 × 25pt. Works both for DVI/PS and PDF output by inserting relevant special code directly in raw PS or PDF commands, so that no external figure file is needed.

6.5 Defining Custom Styles

A 'style' is simply a collection of customization commands such as presented above, combined together in a LaTeX macro that is named `\uebstyle@<StyleName>`. If you also provide the command named `\uebstyle@<StyleName>@<Language>`, where `<Language>` is the language of the sheet (i.e. `English` or `Deutsch`), then it is called, too, for the relevant language.

A (simple) custom style could be defined as

```
\makeatletter
\newcommand{\uebstyle@DummyStyle}{%
  \UebungLabelEnum{\alph*)}%
  \UebungLabelEnumSub{\roman*)}%
  \UebungLoesungFont{}%
  \UebungExTitleFont{\bfseries}%
}
\newcommand{\uebstyle@DummyStyle@Deutsch}{%
  \UebungLabel{Aufgabe}%
}
\makeatother
```

This style could be set by calling the following command before `\begin{document}`:

```
\UebungStyle{DummyStyle}
```

The exercise sheet would then have exercise parts numbered "a)", "b)", etc., the solutions font would be normal font and not a small font, and the exercise titles would be bold instead

of bold italic. Also, if the sheet happened to be in German, then the exercise label would be "Aufgabe X." instead of "Übung X.".

If you define custom styles, *please* it would be nice to let me know, so that I can include them in future versions of `ethuebung`. Contact me at `pfaist@ethz.ch`.

6.6 Some Internals

The LaTeX style package is thoroughly commented and should be pretty readable. It uses some LaTeX hacks, which I have tried to document properly.

Contact me if you need help decyphering the code, or if you have suggestions or comments. Feel free to send me an e-mail at `pfaist@ethz.ch`.

7 Handy Scripts: `pdflatexex`, `pdflatexsol` and `pdflatextips`

There are two ways within the LaTeX file to generate a solutions sheet or a tips sheet:

- use the relevant package option `[sol]` or `[tips]`;
- use the relevant command `\UebungMakeSolutionsSheet` (p. 14) or `\UebungMakeTipsSheet` (p. 16).

For convenience, there are a few scripts that directly generate the different PDFs, with a standard suffix naming conventions, and without having to modify the original LaTeX code. If you have a file named `qit11-ex06.tex`, you can generate the exercise sheet named `qit11-ex06_ex.pdf` by simply running the `pdflatexex` script:

```
> pdflatexex qit11-ex06.tex
```

Likewise, a solution sheet named `qit11-ex06_sol.pdf` can be generated using the `pdflatexsol` script, with exactly the same LaTeX file:

```
> pdflatexsol qit11-ex06.tex
```

And finally, the tips sheet `qit11-ex06_tips.pdf` is simply generated using the command:

```
> pdflatextips qit11-ex06.tex
```

These scripts are provided alongside with the `ethuebung.sty` package. You should place them in your `$PATH` in order for them to be accessible to the shell.

In order to use these scripts, the LaTeX file should be set up as for compiling the exercise sheet (e.g., no `[sol]` or `[tips]` package option).

8 Commands Index

9 Package Options Reference

The following is a list of possible package options that can be passed to `ethuebung`. Of course, some of them can be combined:

```
\usepackage[deutsch,sol]{ethuebung}
```

Obviously, some options are incompatible, such as `tips` and `sol`, or of course `english` and `deutsch` (!).

`[sol]` Sets the sheet to be in solutions mode, displaying all inline solutions. See section 4.1.

`[tips]` Sets the sheet to be in tips mode, displaying all inline tips. See section 4.4.

`[deutsch]` Sets the sheet to be in German, and loads the German `babel` package. This option has the same effect as `\UebungLanguage{Deutsch}`. See section 2.3.

`[english]` Sets the sheet to be in English, and loads the English `babel` package. By default if you don't include this option, the babel package is not loaded. This option has the same effect as `\UebungLanguage{English}`. See section 2.3.

`[nobabel]` Instructs `ethuebung` never to load the `babel` package. This is compatible with `english` or `deutsch` package options as well as with `\UebungLanguage` (p. 6); these commands or options will then only set the relevant texts without loading the `babel` package.

`[noexenum]` Sets the sheet to NOT define the `\begin{exenumerate}...\end{exenumerate}` (p. 8) environment, thus NOT including the package `enumitem`. Use this if you have compatibility issues with `enumitem` and if you don't need the `\begin{exenumerate}...\end{exenumerate}` environment.

`[nogeom]` Instructs the package NOT to touch the page geometry. By default, `ethuebung` lays out the page with specific margins that are more suitable than the default for an exercise sheet (using package `geometry`). Use this option to disable this behavior.

`[nohyperref]` Instructs `ethuebung` NOT to load packages `hyperref` and `xcolor`. By default, both these packages are loaded, and anchors are placed in the PDF file (so that they can be refered to nicely, and so that `\ref`'s turn into links). If you need your own options to `hyperref`, or if you want to disable `hyperref` completely, use this option. If you get problems with the `xcolor` or `color` package (e.g. because of option clashes), try first to include one of these packages *before* calling `\usepackage{ethuebung}`.