The HomeworkAssignment class*

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Contents

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*This document corresponds to HomeworkAssignment v2.4, dated 2017/04/07.

1 Abstract

This class provides a relative simple document–type for homework, mainly created for assignments at the University This class is inherited from `article`, it is not perfect, but I am trying my verry best.

2 Options

`problemstyle=<1>`
`subproblemstyle=<1>`
`subsubproblemstyle=<1>`

These options allow the customizatuion of the displayed numbers. For Example, if `problemstyle=Roman, subproblemstyle=arabic, subsubproblemstyle=roman` is passed, The first subsubproblem of the first subproblem of the first problem would be labled as **i)** of **Problem I.1**.

Available options are `arabic`, `Alph`, `alph`, `Roman`, and `roman`. Standard values are: `problemstyle=arabic, subproblemstyle=alph, subsubproblemstyle=roman`.

`design=<1>`   Allows the User to select an older page-style, for backwards compatibility.

Recognized values are `v1` and `v2`. Everytime a version Changes the default look, a new possible value will be added.

Only set this if you really need to get an old look, *older styles are not going to be maintained!*

`tikz`   Loads TikZ-Package and a couple of Styles, usefull for Papers in Computer-Science and ;athematics. See 8.2 for more informations

`fleqn`   Passes `fleqn` to amsmath

2.1 Inherited options

Because the class is inherited by article, every Option that can be passed to article, will be passed to article.

3 Commands

3.1 Document Informations

`\subject`
`\kurs`
Sets the subject of the document. Takes the subject as argument. Standard Value is "Kein Kurs"
`\kurs` is deprecated.

`\tutorial`
`\tutorium`
Sets the tutorial of the author. Takes it as an argument. Stamdard Value is empty, so that this command can be omitted.
`\tutorium` is deprecated.

`\deadline`
`\abgabe`
Sets the deadline of the document. Takes it as an argument. Standard value is `\today`.
`\abgabe` is deprecated

`\sheetTitle`
Sets a descriptional Title of the Sheet, will be written in the header of every page.

3.1.1 Inherited from `article`

`\author` Sets the author of the document.
`\date` Sets the date of the document.

3.2 Sectioning

Because the class is designed for Assignments, the sectioning-commands are different from Article

3.2.1 'plain' Sectioning

`\problem`
`\subproblem`
`\subsubproblem`
These commands work like theyr counterpart in article, except that there will be no number, nor will they increase a counter. Nevertheless, hey will be shown in the table of contents.

`\keyword{#1}`
Creates a new Paragraph ,which will start with the Argument in Bold, followed by two non-breaking spaces.
The following Macros make use of `\keyword`, so it is suggested to use them instead.

`\solution`
`\proof`
`\given`
`\toShow`
`\assumption`
`\supposeThat`
They work like `\keyword`, but take only an optional Argument print out "Solution", "Proof" "Given", "To show", "Assumption", and "Suppose that", respectively [1], via `\keyword`. If an argument is passed, they print out this argument

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[1] As of v1.6, Translations are added, depending on the choosen Language, there may be an other Text displayed.
See 8.4 for all Translations

after the keyword. They are not mentioned in the table of contents.

3.2.2 'better' Sectioning

The following commands are an augmented version of the "plain" commands.

`\newproblem`
`\newproblem*`
`\newsubproblem`
`\newsubsubproblem`

These commands require no argument, and automatically create a numbered title. The optional Argument is the new value for the coresponding counter. Normally, `\newproblem` adds the new Created Problem to the grading–table (see 3.4), `\newproblem*` does not do this.

3.3 Useful Macros

3.3.1 Quod Erat Demunstarndum, End of Proof

`\QED`
`\EOP`
`\eop`

Display a flushed-right QED, □, or ■, respectively. `\qed` is not implemented, to keep compatibility to several Math-packages, which define the later.

3.3.2 Quod Non Erat Demunstarndum at iucundum est

`\QNED`
`\qned`

Display a flushed-right △. `\QNED` displays it in a new line, `\qned` at the end of the same line.

In Mathematical proofs this symbol is used to mark things, which we did not intend to proof, but are interesting anyway.

3.3.3 Stolen Goods

≫Das ist alles nur geklaut≪

∼Tobias Künzel

These Commands are not mine, they are all stolen from Alexander Bartolomey's[2] `amath`-Class[3]

`\N`
`\Z`
`\R`
`\Q`
`\C`
`\F`
`\Primes`

Defines a set of mathematical sets, which are verry usefull (see Table 1)

Command	Output	Description
`\N`	$\mathbb{N}$	Natural Numbers
`\Z`	$\mathbb{Z}$	Whole Numbers
`\Q`	$\mathbb{Q}$	Rational Numbers
`\R`	$\mathbb{R}$	Real Numbers
`\C`	$\mathbb{C}$	Complex Numbers
`\F_n`	$\mathbb{F}_n$	Prime Field to base n
`\Primes`[4]	$\mathbb{P}$	Set of all Primes

Table 1: Field-Commands

---

[2] "Occloxium" on GitHub:`https://github.com/occloxium`

[3] `amath.sty` is part of Alexander Bartolomey's Alphabet Classes: `https://github.com/occloxium/AlphabetClasses`

Functions and Operators   Output usefull Plaintext-Operators and Functions. See table 2. Require Math-mode

Command	Output
\divides and property	Prints a vertical Bar
\Var	Var
\Perm	Perm
\Comb	Comb
\MComb	MComb
\Pot	Pot
\Map	Map
\Bin	Bin
\GL	GL
\id	id
\dx	dx
\excup	$\dot\cup$
\diff{<1>}	$\frac{d}{d<1>}$

Table 2: Text-like Functions

\falls prints out »falls«[5]

3.3.4 Rounding

Require Mathmode

Command	Output	Meaning
\floor{<1>}	$\lfloor <1> \rfloor$	floor <1>
\ceil{<1>}	$\lceil <1> \rceil$	ceil <1>
\roundHU{<1>}	$\lceil <1> \rfloor$	Round <1> "half up" ($\lfloor <1> +\frac{1}{2}\rfloor$)
\roundHD{<1>}	$\lfloor <1> \rceil$	Round <1> "half down" ($-\lfloor <1> -\frac{1}{2}\rfloor$)

Table 3: Rounding Functions

3.4 Grading Table

This Document-Class is still mainly designed for Homework, so it would be nice, if there was a table to write Grades into, wouldn't it?

\addToGradingTable   Adds the given parameter as an excercise to the Grading-Table. All Problems, created with \newproblem are added automatically.

\makeGradingTable   Prints out the Table containig all Defined exercises ($\neq$Problems).   Like

---

[4]Has to be \Primes, because \P is already in use
[5]In German, actual Translation may differ

`\tableofcontent`, it needs a second run of LaTeX, until all are added.
See example documents fot output

4 Dependencies

4.1 Mandatory Dependencies

This class is build uppon article, so of course the first dependency is:

article 1992 Leslie Lamport, 1994-97 Frank Mittelbach Johannes Braams, The LaTeX-Team, https://www.ctan.org/pkg/kvoptions,

Because I am very lazy, the `HomeworkAssignment` is "a little bit" bloated. These are all required packages:

kvoptions Heiko Oberdiek, https://www.ctan.org/pkg/kvoptions,
for `key=value`–style options

suffix David Kastrup, https://www.ctan.org/pkg/suffix,
Makes it easy to define `\macro*` commands

xifthen Josselin Noirel, https://www.ctan.org/pkg/xifthen,
For if–else–structures

translations Clemens Niederberger, https://www.ctan.org/pkg/translations,
Implements an easy method of translations.

amsmath The LaTeX–Team, Frank Mittelbach Rainer Schöpf, et al.,
https://www.ctan.org/pkg/amsmath,
For better math-typesetting

amssymb American Mathematical Society, mirror.ctan.org/fonts/amsfonts/
doc/amssymb.pdf,
For more mathematical symbols

etoolbox Philipp Lehman (inactive), Joseph Wright, https://www.ctan.
org/pkg/etoolbox,
The package is a toolbox of programming facilities geared primarily towards
LaTeXclass and package authors

array Frank Mittelbach, David Carlisle, The LaTeX–Team, https://
www.ctan.org/pkg/array,
A new implementations for tables and arrays

> **array** possibly can be removed

4.2 Recommended Dependencies

These are not loaded automatically, but require a switch as option (see section 2). The switch is typically the name of the package.

tikz TILL TANTAU, MARK WIBROW, CHRISTIAN FEUERSÄNGER ET AL., `https://www.ctan.org/pkg/pgf`,
> An incredible powerfull image tool. When loading TikZ, the HomeworkAssignment automatically loads a shipload of TikZ–librarys and own styles. See subsection 8.2 for more informations

> I intend to move these styles to a own package, so that they are usable without the HomeworkAssignment

listings 19962004 CARSTEN HEINZ, 20062007 BROOKS MOSES, 2013 JOBST HOFFMANN, `https://www.ctan.org/pkg/listings`,
> For source–code. Sourcecode in the HomeworkAssignment is automatically framed, printed in `scriptsize`, and linebeals will be introduced

5 Development and support

The package is developed at *GitHub*:

> `https://github.com/ACHinrichs/LaTeX-templates`

Please refer to that site for any bug report or development information.

6 Changelog

v1.0 - 2016/10/23 Initial

v1.1 - 2016/11/02 ...

v1.2 - 2016/11/03 ...

v1.3 - 2016/12/01 Provide the Class as .dtx file and more

v1.4 - 2017/04/29 "Minor" bugfixes

v1.5 - 2017/04/29 Problems are displayed in the table of contents. Type of numeration is now configurable.

v1.5.1 - 2017/04/29 Bugfix

v1.5.2 - 2017/04/29 Add version-number

v1.6 - 2017/05/02 Add Translations (German and English)
Add `\given` and `\toShow`
Add `\QED`, `\EOP`, and `\eop`

v1.6.3 - 2017/05/05 Bugfixes

v1.6.4 - 2017/05/09 Change `\eop` to be in the same line

v1.7 - 2017/05/09 Add `\QNED`

v2.0 - 2017/05/23 Change Margins,
Add Option to select older Page-Style,
Change standardlayout to twocolumn and twoside
~~Steal~~ Use Macros by Alexander Bartolomey (See 3.3.3)
Add some TikZ-Styles
Add round functions

v2.2 - 2017/06/17 Add Grading-table
Add `\keyword`, `\assumption`, and `\supposeThat`
Add `\newproblem*`
Add `\sheetTitle`
Change equation-numbering to uppercase roman

v2.2.1 - 2017/06/20 Fix error with commands like `\solution`
and `\keyword`.

v2.4 - 2017/04/07 Fix math alignment,
Add option for flushed left equations,
Update amath port to use

6.1 Version–Scheme

Since Version 2.0 the following version–scheme applies:

Major Version   has to be increased, if

- there are changes, which create visible changes in the output of existing documents (except for bugfixes), or

- a command is removed or changed in a way, that existing documents do not compile with the new version.

Minor Version   has to be increased, if

- new backwards compatible commands are introduced

    – Bugfixes may be introduced too.

The minor version of stable releases is always even, the minor version of developtment versions is always odd. (0 counts as even).

Patches   May be introduced on Stable Branch. With every non-document-breaking bugfix, the patch–number has to be incremented.
Because Fixing Bugs is a part of developtment, developtment-versions to not have numeric patch–numbers, but alphabetic identifiers, directly after the minor–version.

7 Examples

For examples, pleas see the Git-Repo at `https://github.com/ACHinrichs/LaTeX-templates`

8 Implementation

The following part is verry boring, but I have not found a solution to create a `.cls`–file without including the implemetation into the document. Loads LaTeX2e and sets the Version Loads the `article`, which is the base-class.

8.1 Packages & Options

```
1 \RequirePackage{kvoptions}
2 \SetupKeyvalOptions{ family=hwa,
3   prefix=hwa@ }
4 \DeclareStringOption[arabic]{problemsty}
5 \DeclareStringOption[alph]{subproblemsty}
6 \DeclareStringOption[roman]{subsubproblemsty}
7 \DeclareBoolOption[false]{listings}
8 \DeclareStringOption[v2]{design}
9 \DeclareBoolOption[true]{twoside}
10 \DeclareComplementaryOption{oneside}{twoside}
11 \DeclareBoolOption[true]{twocolumn}
12 \DeclareComplementaryOption{onecolumn}{twocolumn}
13 \DeclareBoolOption[false]{tikz}
14 % Redefine the article-options
15 %    \begin{macrocode}
16 \DeclareDefaultOption{\PassOptionsToClass{\CurrentOptionKey}{article}}
```

Processes the Options and loades article

```
17 \ProcessKeyvalOptions*
18 \ifhwa@twoside
19 \PassOptionsToClass{twoside}{article}
20 \else
21 \PassOptionsToClass{oneside}{article}
22 \fi
23 \ifhwa@twocolumn
24 \PassOptionsToClass{twocolumn}{article}
25 \else
26 \PassOptionsToClass{onecolumn}{article}
27 \fi
28 \LoadClass{article}
```

Loads required Packages

```
29 \RequirePackage{suffix}
30 \RequirePackage{fancyhdr}
31 \RequirePackage{xifthen}
32 \RequirePackage{translations}
```

```
33 \PassOptionsToPackage{fleqn}{amsmath}
34 \RequirePackage{amsmath}
35 \RequirePackage{amssymb}
36 \ifhwa@listings
37 \RequirePackage{listings}
38 \lstset{
39   frame = single,
40   breaklines = true,
41   postbreak=\raisebox{0ex}[0ex][0ex]{\ensuremath{\hookrightarrow\space}},
42   basicstyle=\scriptsize
43 }
44 \else
45 \empty
46 \fi
47 \RequirePackage{etoolbox}
48 \RequirePackage{array}
```

8.2   TikZ-Styles

If tikz is Wanted, load Usefull Styles

```
49 \ifhwa@tikz
50 \RequirePackage{tikz}
51 \usetikzlibrary{shapes,arrows,positioning,decorations,
52   automata,backgrounds,petri,bending,
53   shapes.multipart}
54 \tikzset{
55   treenode/.style = {shape=circle, rounded corners,
56     draw, align=center},
57   graynode/.style = {fill=gray},
58   normalnode/.style    = {treenode, font=\Large, bottom color=white},
59   array/.style = {rectangle split,
60     rectangle split horizontal,
61     rectangle split,
62     draw}
63 }
64 \fi
```

8.3   Geometry

Make sure that this is the last Package loaded

```
65  % Make sure that this is the last Package loaded
66 \ifthenelse{\equal{\hwa@design}{v2}}{
67   \RequirePackage{geometry}
68   \ifhwa@twocolumn
69   \geometry{top=2cm, bottom=2cm, left=2cm,
70     headsep=14pt,hmarginratio={1:1}}
71   \else
72   \geometry{top=2cm, bottom=2cm, width=35em,
73     headsep=14pt,hmarginratio={4:3}}
74   \fi
```

```
75 }{
76   \ifthenelse{\equal{\hwa@design}{v1}}{
77     \empty
78   }{
79     \ClassError{HomeworkAssignment}{Value '\hwa@design' for key 'design'
80     is not known}{The option design takes an argument to set the
81     Pagestyle to the one of a previous version. Acceptable values are
82     'v1', or 'v2'}
83   }
84 }
```

8.4   Translations

Load translations, currently supports English and German, Fallback is German

```
85 \DeclareTranslationFallback{aufgabe}{Aufgabe}
86 \DeclareTranslationFallback{loesung}{L\"osung}
87 \DeclareTranslationFallback{beweis}{Beweis}
88 \DeclareTranslationFallback{uebungsgruppe}{\"Ubungsgruppe}
89 \DeclareTranslationFallback{abgabe}{Abgabe}
90 \DeclareTranslationFallback{zuZeigen}{Zu zeigen}
91 \DeclareTranslationFallback{gegeben}{Gegeben}
92 \DeclareTranslationFallback{falls}{falls}
93 \DeclareTranslationFallback{Annahme}{Annahme}
94 \DeclareTranslationFallback{Angenommen-dass}{Anngenommen, dass}
95
96 \DeclareTranslation{German}{aufgabe}{Aufgabe}
97 \DeclareTranslation{German}{loesung}{L\"osung}
98 \DeclareTranslation{German}{beweis}{Beweis}
99 \DeclareTranslation{German}{uebungsgruppe}{\"Ubungsgruppe}
100 \DeclareTranslation{German}{abgabe}{Abgabe}
101 \DeclareTranslation{German}{zuZeigen}{Zu zeigen}
102 \DeclareTranslation{German}{gegeben}{Gegeben}
103 \DeclareTranslation{German}{falls}{falls}
104 \DeclareTranslation{German}{Falls}{Falls}
105 \DeclareTranslation{German}{Annahme}{Annahme}
106 \DeclareTranslation{German}{Angenommen-dass}{Anngenommen, dass}
107
108 \DeclareTranslation{English}{aufgabe}{Problem}
109 \DeclareTranslation{English}{loesung}{Solution}
110 \DeclareTranslation{English}{beweis}{Proof}
111 \DeclareTranslation{English}{uebungsgruppe}{Tutorial}
112 \DeclareTranslation{English}{abgabe}{Deadline}
113 \DeclareTranslation{English}{zuZeigen}{To show}
114 \DeclareTranslation{English}{gegeben}{Given}
115 \DeclareTranslation{English}{falls}{if}
116 \DeclareTranslation{English}{Falls}{If}
117 \DeclareTranslation{English}{Annahme}{Assumption}
118 \DeclareTranslation{English}{Angenommen-dass}{Suppose that}
```

8.5 Headers & Footers

Sets the page-headers.

All headers are cleread before they get any Text — just to be sure.

The headers look like specified above (**??**). Also inserts the Titlepage.

```
119 \fancypagestyle{firstpage}{
120   %
121   \fancyhf{}
122   % clear all six fields
123   \renewcommand{\headrulewidth}{.7pt}
124   \renewcommand{\footrulewidth}{0pt}
125   \fancyfoot[R]{\thepage}
126   \fancyhead[L]{\hwa@tutorium}
127   \fancyhead[R]{\@date } }
128 \fancypagestyle{followingpage}{
129   \fancyhf{}
130
131   \ifthenelse{\equal{\hwa@design}{v2}}{
132     \ifhwa@twoside % IF
133
134     \fancyhead[RO]{\@author}
135     \fancyhead[LO]{\hwa@kurs\\
136       \hwa@tutorium}
137     \fancyhead[LE]{
138       \ifthenelse{\equal{\hwa@sheetTitle}{}}{}{\hwa@sheetTitle\\}
139       \GetTranslation{abgabe}: \hwa@abgabe
140     }
141     \fancyfoot[RO,LE]{\thepage}
142
143     \else %ELSE
144
145     \fancyhead[R]{\hwa@kurs\\
146       \@author}
147     \fancyhead[L]{\hwa@tutorium\\
148       \ifthenelse{\equal{\hwa@sheetTitle}{}}{}{\hwa@sheetTitle\\}
149       \GetTranslation{abgabe}: \hwa@abgabe}
150     \fancyfoot[R]{\thepage}
151     \fi %ENDIF
152   }{
153     % ==== LEGACY CODE; DO NOT CHANGE ================================
154     \ifthenelse{\equal{\hwa@design}{v1}}{
155       \fancyhead[RE,LO]{\@author}
156       \fancyhead[LE,RO]{\hwa@kurs\\
157         \GetTranslation{abgabe}: \hwa@abgabe}
158       \fancyfoot[RE,LO]{\thepage}
159     }{
160       \ClassError{HomeworkAssignment}{Value '\hwa@design' for key 'design'
161         is not known}{The option design takes an argument to set the
162         Pagestyle to the one of a previous version. Acceptable values are
163         'v1', or 'v2'}
```

```
164     }
165     % ==== END OF LEGACY CODE =======================================
166   }
167   \renewcommand{\headrulewidth}{0.7pt}
168   \renewcommand{\footrulewidth}{0pt}
169 }
170 \pagestyle{followingpage}
```

9   Redefinition of existing Commands

D   isplays equation-numbers as upper-case roman numbers.

```
171 \renewcommand{\theequation}{\Roman{equation}}
```

9.1   Internal commands

9.1.1   Counter–Commands

Counter--Commands   These are used to output the Exercise numbers in the desired style

```
172 \newcommand{\hwa@problemno}{\arabic{problem}}
173 \newcommand{\hwa@subproblemno}{\alph{subproblem}}
174 \newcommand{\hwa@subsubproblemno}{\roman{subsubproblem}}
```

9.1.2   Counter–Style Parser

Counter--Style Parser   This takes a style-input (#1), one of the three previous defined commands (#2) and the coresponding counter (#3) to redefine #1, so that it corresponds to #2. See 9.1.3 for example usement.

```
175 \newcommand{\hwa@parseCounterStyle}[3]{
176 \ifthenelse{\equal{#1}{arabic}}{ \renewcommand{#2}{\arabic{#3}} }{
177   \ifthenelse{\equal{#1}{roman}}{ \renewcommand{#2}{\roman{#3}} }{
178     \ifthenelse{\equal{#1}{alph}}{ \renewcommand{#2}{\alph{#3}} }{
179       \ifthenelse{\equal{#1}{Alph}}{ \renewcommand{#2}{\Alph{#3}} }{
180         \ifthenelse{\equal{#1}{Roman}}{
181           \renewcommand{#2}{\Roman{#3}} }{
182           \ClassError{HomeworkAssignment}{Invalid Value #1 for
183             option Counter-Styling}{Possible Values are alph,
184             arabic, Arabic, roman or Roman.}  } } } } } }
```

9.1.3   Counter–Commands II

ounter--Style ParserCommands II   Redefines the three counter-commands

```
185 \hwa@parseCounterStyle{\hwa@problemsty}{\hwa@problemno}{problem}
186 \hwa@parseCounterStyle{\hwa@subproblemsty}{\hwa@subproblemno}{subproblem}
187 \hwa@parseCounterStyle{\hwa@subsubproblemsty}{\hwa@subsubproblemno}{subsubproblem}
```

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9.1.4 Grading-table

\hwa@gradingtbl@... Defines macros whose contents will be written to the AUX-File and read in the next run, and the usable commands. The later will contain the information, but have to be defined (incase the aux-file does not exist)

```
188 \edef\hwa@gradingtbl@aux@defs{}
189 \newcommand{\hwa@gradingtbl@aux@lineOne}{}
190 \newcommand{\hwa@gradingtbl@aux@lineTwo}{}
191
192 \edef\hwa@gradingtbl@defs{}
193 \newcommand{\hwa@gradingtbl@lineOne}{}
194 \newcommand{\hwa@gradingtbl@lineTwo}{}
```

\addToGradingTable

```
195 \newcommand{\addToGradingTable}[1]{
196   \edef\hwa@gradingtbl@aux@defs{\hwa@gradingtbl@aux@defs|p{1cm}}
197   \edef\hwa@gradingtbl@aux@lineOne{\hwa@gradingtbl@aux@lineOne#1 &}
198   \edef\hwa@gradingtbl@aux@lineTwo{\hwa@gradingtbl@aux@lineTwo   &}
199 }
```

W   rite to aux

```
200 \AtEndDocument{%
201   \immediate\write\@auxout{%
202     \gdef\string\hwa@gradingtbl@defs{\hwa@gradingtbl@aux@defs}
203   }
204   \immediate\write\@auxout{%
205     \gdef\string\hwa@gradingtbl@lineOne{\hwa@gradingtbl@aux@lineOne}%
206   }
207   \immediate\write\@auxout{%
208     \gdef\string\hwa@gradingtbl@lineTwo{\hwa@gradingtbl@aux@lineTwo}%
209   }
210 }
```

\makeGradingTable

```
211 \newcommand{\makeGradingTable}{
212   \begin{table}[hb]
213     \centering
214     \large
215     \expandafter\tabular\expandafter{\hwa@gradingtbl@defs |p{1cm}|}\hline
216     \hwa@gradingtbl@lineOne  $\Sigma$    \\\hline
217     \hwa@gradingtbl@lineTwo  \vspace{.15cm}~\\\hline
218     \endtabular
219   \end{table}
220   }
```

9.2 Commands

\subject   Defines \kurs. \subject equals \kurs

```
221 \newcommand{\hwa@kurs}{?\GetTranslation{subject}?}
```

```
222 \newcommand{\subject}[1]{\renewcommand{\hwa@kurs}{#1}}
223 \newcommand{\kurs}[1]{\subject{#1}}
```

\tutorial   Defines \tutorial. \tutorium equals \tutorial

```
224 \newcommand{\hwa@tutorium}{?\GetTranslation{uebungsgruppe}?}
225 \newcommand{\tutorial}[1]{\renewcommand{\hwa@tutorium}{#1}}
226 \newcommand{\tutorium}[1]{\tutorial{#1}}
```

\sheetTitle   Defines \sheetTitle.

```
227 \newcommand{\hwa@sheetTitle}{}
228 \newcommand{\sheetTitle}[1]{\def\hwa@sheetTitle{#1}}
```

\deadline   Defines \deadline. \abgabe equals \deadline

```
229 \newcommand{\hwa@abgabe}{\today}
230 \newcommand{\deadline}[1]{\def\hwa@abgabe{#1}}
231 \newcommand{\abgabe}[1]{\deadline{#1}}
```

\maketitle   Overrides maketitle.

```
232
233 \renewcommand{\maketitle} {
234   \thispagestyle{firstpage}
235   \setlength{\headheight}{25pt}
236   \twocolumn[{%
237     \begin{centering}
238       \huge{\textbf{\hwa@kurs}} \vspace{.25cm} {\hrule height 2pt}
239       \vspace{.25cm} \large
240       \ifthenelse{\equal{\hwa@sheetTitle}{}}{}{\hwa@sheetTitle\\}
241       \GetTranslation{abgabe}: \hwa@abgabe\\
242       \vspace{.5cm} \hrule \vspace{.25cm}
243       \normalsize{\@author}\\
244       \vspace{.25cm} \hrule \vspace{.25cm} \normalsize
245     \end{centering}
246   }]
247 }
```

Defines and initialize all counters.

```
248 \newcounter{problem} \setcounter{problem}{0}
249 \newcounter{subproblem}[problem] \setcounter{subproblem}{0}
250 \newcounter{subsubproblem}[subproblem] \setcounter{subsubproblem}{0}
251
```

Defines 'plain' sectioning-commands. See 3.2 for more informations.

```
252 \newcommand{\problem}[1]{\@startsection{problem}%Name
253   {1}%Level
254   {\z@}%indent
255   {-2em \@plus -1em \@minus -1em}%beforeskip
256   {1ex \@plus .5ex}%afterskip
257   {\normalfont\Large\bfseries}%style
258   *{#1} \addcontentsline{toc}{section}{#1}
```

```
259 }
260
261 \newcommand{\subproblem}[1]{\@startsection{subproblem}%Name
262   {2}%Level
263   {\z@}%indent
264   {-1em \@plus -.5em \@minus -.5em}%beforeskip
265   {.5ex \@plus .5ex}%afterskip
266   {\normalfont\large\bfseries}%style
267   *{#1} \addcontentsline{toc}{subsection}{#1} }
268
269 \newcommand{\subsubproblem}[1]{\@startsection{subsubproblem}%Name
270   {3}%Level
271   {\z@}%indent
272   {-.5em}%beforeskip
273   {.5em}%afterskip
274   {\normalfont\bfseries}%style
275   *{#1} }
276
277 \newcommand{\keyword}[1]{\@startsection{keyword}%Name
278   {4}%Level
279   {\parindent}%indent
280   {-.1em}%beforeskip
281   {\z@}%afterskip
282   {\normalfont\bfseries}%style
283   *{#1~~}
284 }
285
286 \newcommand{\solution}[1][]{\keyword{\GetTranslation{loesung}\ifstrempty{#1}{}{~#1}:}}
287
288 \newcommand{\proof}[1][]{\keyword{\GetTranslation{beweis}\ifstrempty{#1}{}{~#1}:}}
289
290 \newcommand{\toShow}[1][]{\keyword{\GetTranslation{zuZeigen}\ifstrempty{#1}{}{~#1}:}}
291
292 \newcommand{\given}[1][]{\keyword{\GetTranslation{gegeben}\ifstrempty{#1}{}{~#1}:}}
293
294 \newcommand{\assumption}[1][]{\keyword{\GetTranslation{Annahme}\ifstrempty{#1}{}{~#1}:}}
295
296 \newcommand{\supposeThat}[1][]{\keyword{\GetTranslation{Angenommen-dass}\ifstrempty{#1}{}{~#1}}
297
298
```

Defines 'better' sectioning commands. See 3.2 and 3.2.2 for more informations.

```
299 \newcommand{\newproblem}[1][]{
300   \newproblem*[#1]
301   \addToGradingTable{\# \hwa@problemno}
302 }
303
304 \WithSuffix\newcommand\newproblem*[1][]{\stepcounter{problem}
305   \ifthenelse{\equal{#1}{}} { } {\setcounter{problem}{#1}}
306   \problem{\GetTranslation{aufgabe} \hwa@problemno}
```

```latex
307 }
308
309 \newcommand{\newsubproblem}[1][]{\stepcounter{subproblem}
310   \ifthenelse{\equal{#1}{}} { } {\setcounter{subproblem}{#1}}
311   \subproblem{\GetTranslation{aufgabe} \hwa@problemno{}.\hwa@subproblemno} }
312
313 \newcommand{\newsubsubproblem}[1][]{\stepcounter{subsubproblem}
314   \ifthenelse{\equal{#1}{}} { } {\setcounter{subsubproblem}{#1}}
315   \subsubproblem{\hwa@subsubproblemno)} }
316
```

```latex
317 \newcommand{\QED}{\begin{flushright}
318     \textit{QED}
319   \end{flushright}
320 }
321 \newcommand{\EOP}{\begin{flushright}
322     $\square$
323   \end{flushright}
324 }
325 \newcommand{\eop}{\hfill$\blacksquare$}
```

demonstrandum at iucundum est

```latex
326 \newcommand{\QNED}{\begin{flushright}
327     $\triangle$
328   \end{flushright}
329 }
330 \newcommand{\qned}{\hfill$\triangle$}
```

Rounding brakets

Round brakets

```latex
331 \newcommand{\floor}[1]{\ensuremath{\left\lfloor #1 \right\rfloor}}
332 \newcommand{\ceil}[1]{\ensuremath{\left\lceil #1 \right\rceil}}
333 \newcommand{\roundHU}[1]{\ensuremath{\left\lceil #1 \right\rfloor}}
334 \newcommand{\roundHD}[1]{\ensuremath{\left\lfloor #1 \right\rceil}}
```

The following Macros are all stolen (and adapted) from occloxium (see 3.3.3)

Math Common Set Symbols

```latex
335 \newcommand{\N}{\ensuremath{\mathbb{N}}}
336 \newcommand{\Z}{\ensuremath{\mathbb{Z}}}
337 \newcommand{\R}{\ensuremath{\mathbb{R}}}
338 \newcommand{\Q}{\ensuremath{\mathbb{Q}}}
339 \newcommand{\C}{\ensuremath{\mathbb{C}}}
340 \newcommand{\F}{\ensuremath{\mathbb{F}}}
341 % The last one is mine
342 \newcommand{\Primes}{\ensuremath{\mathbb{P}}}
```

Mathematical Functions

```
343 \DeclareMathOperator{\GL}{GL}
344 \DeclareMathOperator{\id}{id}
345 \DeclareMathOperator{\Var}{Var}
346 \DeclareMathOperator{\Perm}{Perm}
347 \DeclareMathOperator{\MComb}{MComb}
348 \DeclareMathOperator{\Comb}{Comb}
349 \DeclareMathOperator{\Pot}{Pot}
350 \DeclareMathOperator{\Map}{Map}
351 \DeclareMathOperator{\Hom}{Hom}
352 \DeclareMathOperator{\Ker}{Ker}
353 \DeclareMathOperator{\Intpol}{Intpol}
354 \DeclareMathOperator{\Pol}{Pol}
355 \DeclareMathOperator{\Sol}{Sol}
356 \DeclareMathOperator{\Bin}{Bin}
357 \DeclareMathOperator{\charakteristik}{char}
358 \newcommand{\diff}[1]{\ensuremath{\frac{d}{d#1}}}
359 \newcommand{\dx}{\:dx}
360
361 \newcommand{\divides}{\ensuremath{\ |\ }}
362 \newcommand{\property}{\ensuremath{\ |\ }}
363
364 \renewcommand{\dim}[1][]{\ensuremath{\text{dim}_{#1}\ }}
365 \renewcommand{\Im}{\ensuremath{\text{Im}\ }}
366
367 \newcommand{\excup}{\ensuremath{\stackrel{.}{\cup}}}
368
369 \newcommand{\falls}{\text{\ \GetTranslation{falls}}\ }
```

Math Big Quantors

```
370 \let\oforall\forall
371 \let\oexists\exists
372 \renewcommand{\forall}{\ensuremath{\hskip 2pt \oforall \hskip 2pt}}
373 \renewcommand{\exists}{\ensuremath{\hskip 2pt \oexists \hskip 2pt}}
374 \newcommand{\bigforall}{\mbox{\raisebox{-2pt}[\height][\depth]{\Large $\mathsurround4pt\forall$
375 \newcommand{\bigexists}{\mbox{\raisebox{-2pt}[\height][\depth]{\Large $\mathsurround4pt\exists$
```

The End

```
376 \endinput
```