The homeworkassignment*class†

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Contents

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*The name was changed with version v3.0, to become compatible with CTANs guidlines and to maintain a degree of backwards compatibility. The class was called HomeworkAssignment prior to v3.0

†This document corresponds to homeworkassignment v3.1, dated 2018/11/10.

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   Dependencies

2.1   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

xparse FRANK MITTELBACH, CHRIS ROWLEY, DAVID CARLISLE, THE LaTeX3 PROJECT, `https://ctan.org/pkg/xparse`,
The package provides a high-level interface for producing documentlevel commands. In that way, it offers a replacement for LaTeX 2_ε's `\newcommand` macro, with significantly improved functionality.

gillius BOB TENNENT, `https://ctan.org/pkg/gillius`,
A Gillian Sans inspired font, used for all sans serifes fonts

2.2 Recommended Dependencies

These are not loaded automatically, but require a switch as option (see section 3). 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 section 3 for more informations

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

listings CARSTEN HEINZ, BROOKS MOSES, 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

Loads required Packages

```
1 \RequirePackage{suffix}
2 \RequirePackage{fancyhdr}
3 \RequirePackage{xifthen}
4 \RequirePackage{translations}
5 \PassOptionsToPackage{fleqn}{amsmath}
6 \RequirePackage{amsmath}
7 \RequirePackage{amssymb}
8 \RequirePackage{etoolbox}
9 \RequirePackage{array}
10 \RequirePackage{xparse}
```

```
11 \RequirePackage{ifxetex}
12
13
14 \RequirePackage{wasysym}
15 \RequirePackage{adjustbox}
```

3 Options

KV-Options is essential for this.

```
16 \RequirePackage{kvoptions}
17 \SetupKeyvalOptions{ family=hwa,
18   prefix=hwa@ }
19 \DeclareDefaultOption{\PassOptionsToClass{\CurrentOptionKey}{article}}
```

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.

```
20 \DeclareStringOption[arabic]{problemsty}
21 \DeclareStringOption[alph]{subproblemsty}
22 \DeclareStringOption[roman]{subsubproblemsty}
```

tikz
Loads TikZ-Package and a couple of Styles, usefull for Papers in Computer-Science and mathematics. See 3 for more informations

```
23 \DeclareBoolOption[false]{tikz}
```

listings
Loads Listings Package and sets listing-layout to use a small fontsize. Adds indication for linebreaks.

```
24 \DeclareBoolOption[false]{listings}
```

oneside, twoside
Changes layout. oneside is the complementary option to `twoside`
Standard layout is twopaged.

```
25 \DeclareBoolOption[true]{twoside}
26 \DeclareComplementaryOption{oneside}{twoside}
```

onecolumn,twocolumn
Changes layout. onecolumn is the complementary option to `twocolumn`.
Standard Layout has two columns

```
27 \DeclareBoolOption[true]{twocolumn}
28 \DeclareComplementaryOption{onecolumn}{twocolumn}
```

hlines=<1>
KeyValue-option. Takes the level of hlines. Available are `all,decreased,header, none`, with decreasing number of lines; none displays none, header only the one under headers and decreased adds the big line in the title, while all displays all.

```
29 \DeclareStringOption[all]{hlines}
```

Loads article and processes the options

```
30 \ProcessKeyvalOptions*
31 \ifhwa@twoside
```

```
32 \PassOptionsToClass{twoside}{article}
33 \else
34 \PassOptionsToClass{oneside}{article}
35 \fi
36 \ifhwa@twocolumn
37 \PassOptionsToClass{twocolumn}{article}
38 \else
39 \PassOptionsToClass{onecolumn}{article}
40 \fi
41 \LoadClass{article}
42
```

Loads listings, if wanted

```
43 \ifhwa@listings
44 \RequirePackage{listings}
45 \lstset{
46   frame = single,
47   breaklines = true,
48   postbreak=\raisebox{0ex}[0ex][0ex]{\ensuremath{\hookrightarrow\space}},
49   basicstyle=\scriptsize
50 }
51 \else
52 \empty
53 \fi
```

\hwa@hline@L...   Defines new commands to output desired lines and change the constant \hwa@headrulewidth

> ATTENTION: \hwa@hline@LONE breaks the line automatically, in opposite to \hwa@hline@LTWO

```
54
55 \newcommand{\hwa@hline@LONE}{\vspace{.25cm} {\hrule height 2pt}
56   \vspace{.25cm}}
57 \newcommand{\hwa@hline@LTWO}{\vspace{.5cm} \hrule \vspace{.25cm}}
58 \newcommand{\hwa@headrulewidth}{.7pt}
59 \ifthenelse{\equal{\hwa@hlines}{all}}{
60   \renewcommand{\hwa@hline@LONE}{\vspace{.25cm} {\hrule height 2pt}
61     \vspace{.25cm}}
62   \renewcommand{\hwa@headrulewidth}{.7pt}
63   \renewcommand{\hwa@hline@LTWO}{\vspace{.5cm} \hrule \vspace{.25cm}}
64 }{
65   \ifthenelse{\equal{\hwa@hlines}{decreased}}{
66     \renewcommand{\hwa@hline@LONE}{ \vspace{.25cm} {\hrule height 2pt}
67       \vspace{.25cm}}
68     \renewcommand{\hwa@headrulewidth}{.7pt}
69   }{\ifthenelse{\equal{\hwa@hlines}{header}}{
70       \renewcommand{\hwa@headrulewidth}{.7pt}
71     }{\ifthenelse{\equal{\hwa@hlines}{none}}{
```

```
72        \renewcommand{\hwa@headrulewidth}{0pt}
73      }{
74        \ClassError{homeworkassignment}{Value '\hwa@lines' for key 'hlines'
75          is not known}{The option hlines takes an argument to set which
76          hlines are drawn. Possible values are 'all','decreased' , 'header', and
77          'none'. 'all' is standard.}
78      }
79    }
80    \renewcommand{\hwa@hline@LONE}{~\\\vspace{.5cm}}
81  }
82  \renewcommand{\hwa@hline@LTWO}{\vspace{.75cm}}
83 }
```

If tikz is Wanted, load Usefull Styles

```
84 \ifhwa@tikz
85 \RequirePackage{tikz}
86 \usetikzlibrary{shapes,arrows,positioning,decorations,
87   automata,backgrounds,petri,bending,
88   shapes.multipart}
89 \tikzset{
90   treenode/.style = {shape=circle, rounded corners,
91     draw, align=center},
92   graynode/.style = {fill=gray},
93   normalnode/.style    = {treenode, font=\Large, bottom color=white},
94   array/.style = {rectangle split,
95     rectangle split horizontal,
96     rectangle split,
97     draw}
98 }
99 \fi
```

Make sure that this is the last Package loaded

```
100 \RequirePackage{geometry}
101 \ifhwa@twocolumn
102 \geometry{top=2cm, bottom=2cm, left=2cm,
103    headsep=14pt,hmarginratio={1:1}}
104 \else
105 \geometry{top=2cm, bottom=2cm, width=35em,
106   headsep=14pt,hmarginratio={4:3}}
107 \fi
```

4   Layout

Initially, the homeworkassignment had a verry *special* appereance, which became much more customizable with version 3.0, see **??** if you want to know how.

4.1   Headers & Footers

Sets the page-headers.
All headers are cleared before they get any Text — just to be sure.

The headers have the date on the subject and the author on the right side, the tutorial, sheat-title and deadline on the left side, the pagenumber is displayed in the right footer.
If the document is twopaged, the informations in the headers are splittet, so that author and subject are displayed only on odd pages and the title on even, the pagenumber is displayed on the right side on odd pages and on the left side on even pages.
On the first page, only the date and tutorial will be displayed in the header, the rest of infomration should be in the title.

```
108 \fancypagestyle{firstpage}{
109    %
110    \fancyhf{}
111    % clear all six fields
112    \renewcommand{\headrulewidth}{\hwa@headrulewidth}
113    \renewcommand{\footrulewidth}{0pt}
114    \fancyfoot[R]{\thepage}
115    \fancyhead[L]{\hwa@tutorium}
116    \fancyhead[R]{\@date } }
117 \fancypagestyle{followingpage}{
118    \fancyhf{}
119    \ifhwa@twoside % IF
120    \fancyhead[RO]{\@author}
121    \fancyhead[LO]{\hwa@kurs\\
122      \hwa@tutorium}
123    \fancyhead[LE]{
124      \ifthenelse{\equal{\hwa@sheetTitle}{}}{}{\hwa@sheetTitle\\}
125      \GetTranslation{abgabe}: \hwa@abgabe
126    }
127    \fancyfoot[RO,LE]{\thepage}
128
129    \else %ELSE
130
131    \fancyhead[R]{\hwa@kurs\\
132      \@author}
133    \fancyhead[L]{\hwa@tutorium\\
134      \ifthenelse{\equal{\hwa@sheetTitle}{}}{}{\hwa@sheetTitle\\}
135      \GetTranslation{abgabe}: \hwa@abgabe}
136    \fancyfoot[R]{\thepage}
137    \fi %ENDIF
138    \renewcommand{\headrulewidth}{\hwa@headrulewidth}
139    \renewcommand{\footrulewidth}{0pt}
140 }
141 \pagestyle{followingpage}
```

4.2 Enhance Mathenvironments

A couple of thigns, to make math-environments more beautifull and compact.

`\theequation`   Displays equation-numbers as upper-case roman numbers.

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

`\allowdisplaybreaks`   Allow pagebreaks in Mathmode

```
143 \allowdisplaybreaks
```

4.3 fonts

I fancy the Gillius-Font-Family, so that is the default Sans-Serif font, when using XeTeX, The template does default to Gillius ADF, which is available for free, licensed under the GNU License.

```
144
145 \ifthenelse{\boolean{xetex}}{
146   \RequirePackage{fontspec}
147   \setsansfont{Gillius ADF}
148 }{
149   \RequirePackage{gillius2}
150 }
```

5 Commands

5.1 Constants

Defines some constants

`\hwa@pointboxsize`   Explains it self.

```
151 \newcommand{\hwa@pointboxsize}{3em}
```

5.2 Document Informations

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

```
152 \newcommand{\hwa@kurs}{?\GetTranslation{subject}?} % To store the value
153 \newcommand{\subject}[1]{\renewcommand{\hwa@kurs}{#1}}
154 \newcommand{\kurs}[1]{\subject{#1}}
```

`\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.

```
155 \newcommand{\hwa@tutorium}{?\GetTranslation{uebungsgruppe}?} % To store the value
```

```
156 \newcommand{\tutorial}[1]{\renewcommand{\hwa@tutorium}{#1}}
157 \newcommand{\tutorium}[1]{\tutorial{#1}}
```

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

```
158 \newcommand{\hwa@abgabe}{\today} % To store the value
159 \newcommand{\deadline}[1]{\def\hwa@abgabe{#1}}
160 \newcommand{\abgabe}[1]{\deadline{#1}}
```

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

```
161 \newcommand{\hwa@sheetTitle}{}
162 \newcommand{\sheetTitle}[1]{\def\hwa@sheetTitle{#1}}
```

5.2.1 Inherited from `article`

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

5.3 Sectioning

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

5.3.1 'plain' Sectioning

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

```
163 \DeclareDocumentCommand\problem{m o}{\@startsection{problem}%Name
164    {1}%Level
165    {\z@}%indent
166    {-2em \@plus -1em \@minus -1em}%beforeskip
167    {1ex \@plus .5ex}%afterskip
168    {\normalfont\Large \sffamily\bfseries}%style
169    *{#1
170       \IfNoValueF{#2}{
171          \hfill
172          \frame{\framebox[\hwa@pointboxsize]{
173             \hfill \normalfont{\large/\small{#2}}}}
174       }
175    }
176    \addcontentsline{toc}{section}{#1}
177 }
```

```
178
179 \DeclareDocumentCommand\subproblem{m o}{\@startsection{subproblem}%Name
180   {2}%Level
181   {\z@}%indent
182   {-1em \@plus -.5em \@minus -.5em}%beforeskip
183   {.5ex \@plus .5ex}%afterskip
184   {\normalfont\large \sffamily\bfseries}%style
185   *{#1
186     \IfNoValueF{#2}{
187       \hfill \framebox[\hwa@pointboxsize]{
188         \hfill\normalfont\large/\small{#2}}
189     }
190   }
191   \addcontentsline{toc}{subsection}{#1}
192 }
193
194 \DeclareDocumentCommand\subsubproblem{m o}{\@startsection{subsubproblem}%Name
195   {3}%Level
196   {\z@}%indent
197   {-.5em}%beforeskip
198   {.5em}%afterskip
199   {\normalfont \sffamily\bfseries}%style
200   *{#1
201     \IfNoValueF{#2}{
202       \hfill \framebox[\hwa@pointboxsize]{
203         \hfill\normalfont\large/\scriptsize{#2}}
204     }
205   }
206 }
207
```

`\keyword` Creates a new Paragraph ,which will start with the Argument in Bold, followed by two non-breaking spaces.

```
208 \newcommand{\keyword}[1]{\@startsection{keyword}%Name
209   {4}%Level
210   {\parindent}%indent
211   {-.1em}%beforeskip
212   {\z@}%afterskip
213   {\normalfont \sffamily\bfseries}%style
214   *{#1~~}
215 }
```

The following Macros make use of `\keyword`, so it is suggested to use them instead.

`\solution` They work like `\keyword`, but take only an optional Argument print out "Solu-
`\proof` tion", "Proof" "Given", "To show", "Assumption", and "Suppose that", respectively
`\given`
`\toShow`
`\assumption`
`\supposeThat`

10

, via `\keyword`. If an argument is passed, they print out this argument after the keyword. They are not mentioned in the table of contents.

```
216 \newcommand{\solution}[1][]{\keyword{\GetTranslation{loesung}\ifstrempty{#1}{}{~#1}:}}
217 \newcommand{\toShow}[1][]{\keyword{\GetTranslation{zuZeigen}\ifstrempty{#1}{}{~#1}:}}
218 \newcommand{\given}[1][]{\keyword{\GetTranslation{gegeben}\ifstrempty{#1}{}{~#1}:}}
219 \newcommand{\assumption}[1][]{\keyword{\GetTranslation{Annahme}\ifstrempty{#1}{}{~#1}:}}
220 \newcommand{\supposeThat}[1][]{\keyword{\GetTranslation{Angenommen-dass}\ifstrempty{#1}{}{~#1}}}
```

5.3.2 '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. They have two optional arguments: `\newproblem[#1]{#2}` where #1 is the (sub(sub))problem-number and #2 are the points. If there is a number of Points assigned to a (sub(sub))problem, then the command will generate a box to write the reched number of points down next to it.

Normally, `\newproblem` adds the new Created Problem to the grading–table (see subsection 5.5), `\newproblem*` does not do this.

They use coutners, of course:

```
221 \newcounter{problem} \setcounter{problem}{0}
222 \newcounter{subproblem}[problem] \setcounter{subproblem}{0}
223 \newcounter{subsubproblem}[subproblem] \setcounter{subsubproblem}{0}
224
225 \DeclareDocumentCommand\newproblem{O{} g}{
226   \stepcounter{problem}% to reset the lower counters
227   \ifthenelse{\equal{#1}{}}{
228     % empty
229   }{
230     \setcounter{problem}{#1}
231   }
232
233   \IfNoValueTF{#2}{
234     \problem{\GetTranslation{aufgabe} \hwa@problemno}
235     \addToGradingTable{\# \hwa@problemno}
236   }{
237     \problem{\GetTranslation{aufgabe} \hwa@problemno}[#2]
238     \addToGradingTable{\# \hwa@problemno}{/#2}
239   }
240 }
241
242 \WithSuffix\newcommand\newproblem*[1][]{\stepcounter{problem}
```

---

[1] As of v1.6, Translations are added, depending on the choosen Language, there may be an other Text displayed.
See section 9 for all Translations

```
243   \ifthenelse{\equal{#1}{}} { } {
244     \stepcounter{problem}% to reset the lower counters
245     \setcounter{problem}{#1}}
246   \problem{\GetTranslation{aufgabe} \hwa@problemno}
247 }
248
249 \DeclareDocumentCommand\newsubproblem{O{} g}{
250   \stepcounter{subproblem}
251   \ifthenelse{\equal{#1}{}} { } {
252     \setcounter{subproblem}{#1}}
253   \IfNoValueTF{#2}{
254     \subproblem{\GetTranslation{aufgabe}
255       \hwa@problemno}.\hwa@subproblemno}
256   }
257   {
258     \subproblem{\GetTranslation{aufgabe}
259       \hwa@problemno}.\hwa@subproblemno}[#2]
260   }
261 }
262
263 \DeclareDocumentCommand\newsubsubproblem{O{} g}{
264   \stepcounter{subsubproblem}
265   \ifthenelse{\equal{#1}{}} { } {\setcounter{subsubproblem}{#1}}
266   \IfNoValueTF{#2}{
267     \subsubproblem{\hwa@subsubproblemno)}
268   }
269   {
270     \subsubproblem{\hwa@subsubproblemno)}[#2]
271   }
272 }
273
```

5.4   Useful Macros

5.4.1   Quod Erat Demunstarndum, End of Proof

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

```
274 \newcommand{\QED}{\begin{flushright}
275     \textsc{Qed}
276   \end{flushright}
277 }
278 \newcommand{\EOP}{\begin{flushright}
279     \(\square\)
280   \end{flushright}
281 }
282 \newcommand{\eop}{\hfill\(\blacksquare\)}
```

5.4.2 Quod Non Erat Demunstarndum at iucundum est

`\QNED`

`\qned`   Display a flushed-right *triangle*. `\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 or things wich are not proofed mathematically,
but are explained in a ay, whcih lets no doubt on their correctness.

```
283 \newcommand{\QNED}{\begin{flushright} \(\triangle\)
284   \end{flushright}
285 }
286 \newcommand{\qned}{\hfill\(\triangle\)}
```

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

`\R`

`\Q`

`\C`

`\F`

`\Primes`

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

```
287 \newcommand{\N}{\ensuremath{\mathbb{N}}}
288 \newcommand{\Z}{\ensuremath{\mathbb{Z}}}
289 \newcommand{\R}{\ensuremath{\mathbb{R}}}
290 \newcommand{\Q}{\ensuremath{\mathbb{Q}}}
291 \newcommand{\C}{\ensuremath{\mathbb{C}}}
292 \newcommand{\F}{\ensuremath{\mathbb{F}}}
293 % The last one is mine
```

---

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

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

[4]Has to be `\Primes`, because `\P` is already in use

```
294 \newcommand{\Primes}{\ensuremath{\mathbb{P}}}
```

```
\GL
\id
\Var
\Perm
\MComb
\Comb
\Pot
\Map
\Hom
\Ker
\Intpol
\Pol
\Sol
\Bin
\charakteristik
\fo
\first
\la
\diff
\partdiff
\dx
\divides
\property
\dim
\Im
\excup
\falls
```

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

Command	Output
`\GL`	GL
`\id`	id
`\Var`	Var
`\Perm`	Perm
`\Comb`	Comb
`\MComb`	MComb
`\Pot`	Pot
`\Map`	Map
`\Hom`	Hom
`\Intpol`	Intpol
`\Pol`	Pol
`\Sol`	Sol
`\Bin`	Bin
`\charakteristik`	char
`\diff{<1>}`	$\frac{d}{d<1>}$
`\partdiff{<1>}`	$\frac{\partial}{\partial<1>}$
`\divides` and `property`	Prints a vertical line
`\dx`	dx
`\excup`	$\dot\cup$
`\fo`	fo
`\first`	fi
`\la`	la

Table 2: Common Functions

`\falls` prints out »falls«[5]

```
295 \DeclareMathOperator{\GL}{GL}
296 \DeclareMathOperator{\id}{id}
297 \DeclareMathOperator{\Var}{Var}
298 \DeclareMathOperator{\Perm}{Perm}
299 \DeclareMathOperator{\MComb}{MComb}
300 \DeclareMathOperator{\Comb}{Comb}
301 \DeclareMathOperator{\Pot}{Pot}
302 \DeclareMathOperator{\Map}{Map}
303 \DeclareMathOperator{\Hom}{Hom}
304 \DeclareMathOperator{\Ker}{Ker}
305 \DeclareMathOperator{\Intpol}{Intpol}
```

---

[5]In German, actual Translation may differ

```
306 \DeclareMathOperator{\Pol}{Pol}
307 \DeclareMathOperator{\Sol}{Sol}
308 \DeclareMathOperator{\Bin}{Bin}
309 \DeclareMathOperator{\charakteristik}{char}
310 \DeclareMathOperator{\fo}{fo}
311 \DeclareMathOperator{\first}{fi}
312 \DeclareMathOperator{\la}{la}
313
314 \newcommand{\diff}[1]{\ensuremath{\frac{d}{d#1}}}
315 \newcommand{\partdiff}[1]{\ensuremath{\frac{\partial}{\partial#1}}}
316 \newcommand{\dx}{\:dx}
317 \newcommand{\divides}{\ensuremath{\ |\ }}
318 \newcommand{\property}{\ensuremath{\ |\ }}
319
320 \renewcommand{\dim}[1][]{\ensuremath{\text{dim}_{#1}\ }}
321 \renewcommand{\Im}{\ensuremath{\text{Im}\ }}
322
323 \newcommand{\excup}{\ensuremath{\stackrel{.}{\cup}}}
324 \newcommand{\falls}{\text{\ \GetTranslation{falls}}\ }
```

5.4.4 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

```
325 \newcommand{\floor}[1]{\ensuremath{\left\lfloor #1 \right\rfloor}}
326 \newcommand{\ceil}[1]{\ensuremath{\left\lceil #1 \right\rceil}}
327 \newcommand{\roundHU}[1]{\ensuremath{\left\lceil #1 \right\rfloor}}
328 \newcommand{\roundHD}[1]{\ensuremath{\left\lfloor #1 \right\rceil}}
```

\bigforall
\bigexists   Redefines big versions of quantors, adds an h-skip to normal version.

```
329 \let\oforall\forall
330 \let\oexists\exists
331 \renewcommand{\forall}{\ensuremath{\hskip 2pt \oforall \hskip 2pt}}
332 \renewcommand{\exists}{\ensuremath{\hskip 2pt \oexists \hskip 2pt}}
333 \newcommand{\bigforall}{\mbox{\raisebox{-2pt}[\height][\depth]{\Large $\mathsurround4pt\forall$
334 \newcommand{\bigexists}{\mbox{\raisebox{-2pt}[\height][\depth]{\Large $\mathsurround4pt\exists$
```

15

5.5   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.

```
335 \DeclareDocumentCommand\addToGradingTable{m g}{
336   \edef\hwa@gradingtbl@aux@defs{\hwa@gradingtbl@aux@defs|p{\hwa@pointboxsize}}
337   \edef\hwa@gradingtbl@aux@lineOne{\hwa@gradingtbl@aux@lineOne{#1} &}
338   \IfNoValueTF{#2}{
339     \edef\hwa@gradingtbl@aux@lineTwo{\hwa@gradingtbl@aux@lineTwo &}
340   }{
341     \edef\hwa@gradingtbl@aux@lineTwo{\hwa@gradingtbl@aux@lineTwo\vfill\hfill
342       {\string\small #2} &}
343   }
344 }
```

\makeGradingTable   Outputs a table to fill in the reached Points. Only shows Problems created by \newproblem.
Displays the according number of maximum points for each problem, if specified.
Displays the total number of maximum Problems, if given by Argument Like \tableofcontent, it needs a second run of LaTeX, until all are added.
It will never overflow the Line-Width, thanks to an adjustbox. [#1]: *Optional.*
The total number of points reachable.

```
345 \DeclareDocumentCommand\makeGradingTable{o}{
346   \begin{table}[hb]
347     \centering
348     \large
349     \begin{adjustbox}{max width=\linewidth}
350       \expandafter\tabular\expandafter{\hwa@gradingtbl@defs ||p{\hwa@pointboxsize}|}\hline
351       \hwa@gradingtbl@lineOne  \(\Sigma\)         \\\hline\small
352       \hwa@gradingtbl@lineTwo  \IfNoValueTF{#1}{~}{\vfill\hfill/#1}\vspace{.15cm}\\\hline
353     \endtabular
354   \end{adjustbox}
355   \end{table}
356 }
```

See example documents fot output

5.5.1   Internal commands

\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)

```
357 \edef\hwa@gradingtbl@aux@defs{}
358 \newcommand{\hwa@gradingtbl@aux@lineOne}{}
359 \newcommand{\hwa@gradingtbl@aux@lineTwo}{}
```

```
360
361 \edef\hwa@gradingtbl@defs{}
362 \newcommand{\hwa@gradingtbl@lineOne}{}
363 \newcommand{\hwa@gradingtbl@lineTwo}{}
```

\write\@auxout   Write to aux

```
364 \AtEndDocument{%
365   \immediate\write\@auxout{%
366     \gdef\string\hwa@gradingtbl@defs{\hwa@gradingtbl@aux@defs}
367   }
368   \immediate\write\@auxout{%
369     \gdef\string\hwa@gradingtbl@lineOne{\hwa@gradingtbl@aux@lineOne}%
370   }
371   \immediate\write\@auxout{%
372     \gdef\string\hwa@gradingtbl@lineTwo{\hwa@gradingtbl@aux@lineTwo}%
373   }
374 }
```

5.6   Title

\maketitle   Overrides maketitle.

```
375 \renewcommand{\maketitle} {
376   \thispagestyle{firstpage}
377   \ifhwa@twocolumn{
378     \twocolumn[{
379       \hwa@maketitletext
380     }]
381   }\else{
382     \hwa@maketitletext
383   }\fi
384 }
```

\hwa@maketitletext   Prints out the title with author etc. Used to reduce code duplication for two- and onecolumn styles

```
385 \newcommand{\hwa@maketitletext}{
386   \begin{centering}
387     \huge{\textsf{\textbf{\hwa@kurs}}}\hwa@hline@LONE \large
388     \ifthenelse{\equal{\hwa@sheetTitle}{}}{}{\textsf{\hwa@sheetTitle}\\}
389     \GetTranslation{abgabe}: \hwa@abgabe\\
390     \hwa@hline@LTWO
391     \normalsize{\@author}\\
392     \hwa@hline@LTWO \normalsize
393   \end{centering}
394 }
```

5.7   Counters

The actual counters are defined in subsubsection 5.3.2.
```

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

```
395 \newcommand{\hwa@problemno}{\arabic{problem}}
396 \newcommand{\hwa@subproblemno}{\alph{subproblem}}
397 \newcommand{\hwa@subsubproblemno}{\roman{subsubproblem}}
```

\hwa@parseCounterStyle   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 **??** for example usement.

```
398 \newcommand{\hwa@parseCounterStyle}[3]{
399   \ifthenelse{\equal{#1}{arabic}}{ \renewcommand{#2}{\arabic{#3}} }{
400     \ifthenelse{\equal{#1}{roman}}{ \renewcommand{#2}{\roman{#3}} }{
401       \ifthenelse{\equal{#1}{alph}}{ \renewcommand{#2}{\alph{#3}} }{
402         \ifthenelse{\equal{#1}{Alph}}{ \renewcommand{#2}{\Alph{#3}} }{
403           \ifthenelse{\equal{#1}{Roman}}{
404             \renewcommand{#2}{\Roman{#3}} }{
405             \ClassError{homeworkassignment}{Invalid Value #1 for
406               option Counter-Styling}{Possible Values are alph,
407               arabic, Arabic, roman or Roman.}  } } } } } }
```

Redefines the three counter-commands:

```
408 \hwa@parseCounterStyle{\hwa@problemsty}{\hwa@problemno}{problem}
409 \hwa@parseCounterStyle{\hwa@subproblemsty}{\hwa@subproblemno}{subproblem}
410 \hwa@parseCounterStyle{\hwa@subsubproblemsty}{\hwa@subsubproblemno}{subsubproblem}
```

6   Environments

6.1   Proof

Used for proofes. Starts bth proof and ends with a End-Of-Proof symbol.

```
411 \NewDocumentEnvironment{proof}{G{\GetTranslation{beweis}} O{\QED}}
412 {
413   \keyword{#1:~~}
414 }
415 {
416   #2
417 }
```

6.2   Proof by contradiction

Used for proofes. Starts bth proof and ends with a End-Of-Proof symbol.

```
418 \NewDocumentEnvironment{contradiction}{}
419 {
420   \begin{proof}{\GetTranslation{beweis}~\GetTranslation{per}~\GetTranslation{Widerspruch}}[\hfi
421   }
422   {
423   \end{proof}
424 }
```

7 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.

8 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 "Layout 2.0"
- Change Margins
- Add Option to select older Page-Style
- Change standardlayout to twocolumn and twoside
- ~~Steal~~ Use Macros by Alexander Bartolomey (See 5.4.3)
- 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

v3.0 - 2017/12/26 "WS 2017"

- Rename to `homeworkassignment`
- Add Environment for various proofs
- Add points for exercises and a place to fill them in
- Add option to remove or decrease or remove the hlines
- Remove legacy styles
- Rework the documentation
- Beautify Maths
- Fix OneColumn-Maktitle-Bug
- Fix Subproblem-Counter not beeing reset
- Merry Christmas!

v3.2 - pending • Make XeLaTex-Compatible
- Fix `\newproblem` requiring a Problem-Number

8.1   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 developt-ment 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 do not have numeric patch–numbers, but alphabetic identifiers, directly after the minor–version.

9 Translations

Homeworkassignment currently supports English and German, fallback language is German. Unfortunatly these two are the only Languages I am capable of translating reliable, so if you want to use an other language, I would be verry happy if you would help me to translate homeworkassignment! Please open an issue, author a pull-request or send me an e-mail.

```
425 \DeclareTranslationFallback{aufgabe}{Aufgabe}
426 \DeclareTranslationFallback{loesung}{L\"osung}
427 \DeclareTranslationFallback{beweis}{Beweis}
428 \DeclareTranslationFallback{uebungsgruppe}{\"Ubungsgruppe}
429 \DeclareTranslationFallback{abgabe}{Abgabe}
430 \DeclareTranslationFallback{zuZeigen}{Zu zeigen}
431 \DeclareTranslationFallback{gegeben}{Gegeben}
432 \DeclareTranslationFallback{falls}{falls}
433 \DeclareTranslationFallback{Annahme}{Annahme}
434 \DeclareTranslationFallback{Angenommen-dass}{Anngenommen, dass}
435 \DeclareTranslationFallback{per}{per}
436 \DeclareTranslationFallback{Widerspruch}{Widerspruch}
437
438 \DeclareTranslation{German}{aufgabe}{Aufgabe}
439 \DeclareTranslation{German}{loesung}{L\"osung}
440 \DeclareTranslation{German}{beweis}{Beweis}
441 \DeclareTranslation{German}{uebungsgruppe}{\"Ubungsgruppe}
442 \DeclareTranslation{German}{abgabe}{Abgabe}
443 \DeclareTranslation{German}{zuZeigen}{Zu zeigen}
444 \DeclareTranslation{German}{gegeben}{Gegeben}
445 \DeclareTranslation{German}{falls}{falls}
446 \DeclareTranslation{German}{Falls}{Falls}
447 \DeclareTranslation{German}{Annahme}{Annahme}
448 \DeclareTranslation{German}{Angenommen-dass}{Anngenommen, dass}
449 \DeclareTranslation{German}{per}{per}
450 \DeclareTranslation{German}{Widerspruch}{Widerspruch}
451
452 \DeclareTranslation{English}{aufgabe}{Problem}
453 \DeclareTranslation{English}{loesung}{Solution}
454 \DeclareTranslation{English}{beweis}{Proof}
455 \DeclareTranslation{English}{uebungsgruppe}{Tutorial}
456 \DeclareTranslation{English}{abgabe}{Deadline}
457 \DeclareTranslation{English}{zuZeigen}{To show}
458 \DeclareTranslation{English}{gegeben}{Given}
459 \DeclareTranslation{English}{falls}{if}
460 \DeclareTranslation{English}{Falls}{If}
461 \DeclareTranslation{English}{Annahme}{Assumption}
462 \DeclareTranslation{English}{Angenommen-dass}{Suppose that}
463 \DeclareTranslation{English}{per}{by}
464 \DeclareTranslation{English}{Widerspruch}{contradiction}
```

End

The End

465 \endinput