

The homeworkassignment*class[†]

Adrian C Hinrichs
adrian.hinrichs@rwth-aachen.de

May 3, 2019

Contents

1	Abstract	2
2	Dependencies	2
2.1	Mandatory Dependencies	2
2.2	Recommended Dependencies	3
3	Options	4
4	Layout	8
4.1	Headers & Footers	8
4.2	Enhance Mathenvironments	9
4.3	fonts	9
4.4	Serife (Default)	9
4.4.1	San Serife	9
4.4.2	Monospace	9
5	Commands	10
5.1	Constants	10
5.2	Document Informations	10
5.2.1	Inherited from <code>article</code>	10
5.3	Sectioning	10
5.3.1	internal Sectioning	11
5.3.2	‘better’ Sectioning	12
5.3.3	Even Better Sectioning-Environments	14
5.4	Useful Macros	15
5.4.1	QUOD ERAT DEMUNSTRANDUM, End of Proof	15
5.4.2	QUOD NON ERAT DEMUNSTARNDUM AT IUCUNDUM EST	15

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

[†]This document corresponds to `homeworkassignment` v4.1b, dated 2019/05/03.

5.4.3	Stolen Goods	15
5.4.4	Rounding	18
5.4.5	ToDoS	18
5.5	Grading Table	19
5.5.1	Internal commands	20
5.6	Title	20
5.7	Counters	21
6	Environments	22
6.1	Proof	22
6.2	Proof by contradiction	22
7	Development and support	23
8	Changelog	23
8.1	Version-Scheme	25
9	Translations	26

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 very best.

2 Dependencies

2.1 Mandatory Dependencies

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

`article` 1992 LESLIE LAMPORT, 1994-97 FRANK MITTELBACH JOHANNES BRAAMS, THE L^AT_EX-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 L^AT_EX-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/amssymb/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 L^AT_EXclass and package authors

array FRANK MITTELBACH, DAVID CARLISLE, THE L^AT_EX-TEAM, <https://www.ctan.org/pkg/array>,
A new implementations for tables and arrays

xparse FRANK MITTELBACH, CHRIS ROWLEY, DAVID CARLISLE, THE L^AT_EX3 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 L^AT_EX 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

hyperref [HTTPS://CTAN.ORG/PKG/HYPERREF](https://CTAN.ORG/PKG/HYPERREF), SebastianRahtz, HeikoOberdiek,
For hyperrefs, obviously

xcolor DR. UWE KERN, <https://www.ctan.org/pkg/xcolor>,
For coloring of ToDos

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

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

array possibly can be removed

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

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 \RequirePackage{wasysym}
14 \RequirePackage{adjustbox}
15
16 \RequirePackage{eso-pic}
17
18 \RequirePackage{xcolor}

```

3 Options

KV-Options is essential for this.

```

19 \RequirePackage{kvoptions}
20 \SetupKeyvalOptions{ family=hwa,
21   prefix=hwa@ }
22 \DeclareDefaultOption{\PassOptionsToClass{\CurrentOptionKey}{article}}

```

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

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

```

23 \DeclareStringOption[arabic]{problemsty}
24 \DeclareStringOption[alph]{subproblemsty}
25 \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

```

26 \DeclareBoolOption[false]{tikz}

```

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

```

27 \DeclareBoolOption[false]{listings}

```

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

```

28 \DeclareBoolOption[true]{twoside}
29 \DeclareComplementaryOption{oneside}{twoside}

```

<code>onecolumn,twocolumn</code>	Changes layout. <code>onecolumn</code> is the complementary option to <code>twocolumn</code> . Standard Layout has one columns <pre>30 \DeclareBoolOption[false]{twocolumn} 31 \DeclareComplementaryOption{onecolumn}{twocolumn}</pre>
<code>punchmark</code>	Adds a mark for an hole puncher. Standard Layout has no marking. <pre>32 \DeclareBoolOption[false]{punchmark}</pre>
<code>hlines=<1></code>	KeyValue-option. Takes the level of <code>hlines</code> . Available are <code>all</code> , <code>decreased</code> , <code>header</code> , <code>none</code> , with decreasing number of lines; <code>none</code> displays none, <code>header</code> only the one under headers and <code>decreased</code> adds the big line in the title, while <code>all</code> displays all. <pre>33 \DeclareStringOption[all]{hlines}</pre>
<code>todos=<1></code>	KeyValue-option. Takes which <code>ToDo</code> s shall be displayed. Available are <code>all</code> (default), <code>nolist</code> , <code>none</code> . See subsection 5.4.5 for explanation of the levels. <pre>34 \DeclareStringOption[all]{todos}</pre>
<code>unicode-math</code>	Loads the <code>unicode-math</code> -package and overwrites the damn <code>\QED-Command</code> <code>unicode-math</code> introduces, that creates a filled out box and only works in <code>math</code> -mode, but not telling you that it only works in <code>math</code> -mode or overwrites an already existing command. For a reason, that currently (06 th of December 2018) slips my mind completly, <code>unicode-math</code> needs to be loaded after <code>article</code> , because it needs to be defined

ATTENTION: Please do never, never, never, never, never ever load `unicode-math` your self, because this breaks **everything**¹

`\end{rant}`

If XeTeX is used, the default option for this is `true`, otherwise it is false.
For the handling of the option, see 5.4.1

```
35 \ifxetex
36 \DeclareBoolOption[true]{unicodemath}
37 \else
38 \DeclareBoolOption[false]{unicodemath}
39 \fi

Loads article and processes the options
40 \ProcessKeyvalOptions*
41 \ifhwa@twoside
42 \PassOptionsToClass{twoside}{article}
43 \else
44 \PassOptionsToClass{oneside}{article}
45 \fi
46 \ifhwa@twocolumn
47 \PassOptionsToClass{twocolumn}{article}
48 \else
49 \PassOptionsToClass{onecolumn}{article}
```

```

50 \fi
51 \LoadClass{article}
52
53 \newboolean{hwa@todos@inplace}
54 \newboolean{hwa@todos@list}
55 \setboolean{hwa@todos@inplace}{true}
56 \setboolean{hwa@todos@list}{true}
57 \ifthenelse{\equal{hwa@todos}{all}}{
58 }{
59   \ifthenelse{\equal{hwa@todos}{nolist}}{
60     \ClassWarning{homeworkassignment}{You specified todos=none,
61       there will be no list of TODO}
62     \setboolean{hwa@todos@list}{false}
63   }{
64     \ifthenelse{\equal{hwa@todos}{none}}{
65       \ClassWarning{homeworkassignment}{You specified todos=none,
66         there will be no TODOs printed in the final document}
67       \setboolean{hwa@todos@list}{false}
68       \setboolean{hwa@todos@inplace}{false}
69     }{
70       \ClassError{homeworkassignment}{hwa@todos is not a valid value
71         for the option 'todos'}
72     }
73   }
74 }

Load Hyperref (breaks if it is loaded before article
75 \RequirePackage{hyperref}

Loads listings, if wanted
76 \ifhwa@listings
77 \RequirePackage{listings}
78 \lstset{
79   frame = single,
80   breaklines = true,
81   postbreak=\raisebox{0ex}[0ex][0ex]{\ensuremath{\hookrightarrow\space}},
82   basicstyle=\scriptsize
83 }
84 \else
85 \empty
86 \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

```

88 \newcommand{\hwa@hline@LONE}{\vspace{.25cm} {\hrule height 2pt}
89 \vspace{.25cm}}
90 \newcommand{\hwa@hline@LTWO}{\vspace{.5cm} \hrule \vspace{.25cm}}
91 \newcommand{\hwa@headrulewidth}{.7pt}
92 \ifthenelse{\equal{\hwa@hlines}{all}}{
93 \renewcommand{\hwa@hline@LONE}{\vspace{.25cm} {\hrule height 2pt}
94 \vspace{.25cm}}
95 \renewcommand{\hwa@headrulewidth}{.7pt}
96 \renewcommand{\hwa@hline@LTWO}{\vspace{.5cm} \hrule \vspace{.25cm}}
97 }{
98 \ifthenelse{\equal{\hwa@hlines}{decreased}}{
99 \renewcommand{\hwa@hline@LONE}{\vspace{.25cm} {\hrule height 2pt}
100 \vspace{.25cm}}
101 \renewcommand{\hwa@headrulewidth}{.7pt}
102 }{\ifthenelse{\equal{\hwa@hlines}{header}}{
103 \renewcommand{\hwa@headrulewidth}{.7pt}
104 }{\ifthenelse{\equal{\hwa@hlines}{none}}{
105 \renewcommand{\hwa@headrulewidth}{0pt}
106 }{
107 \ClassError{homeworkassignment}{Value '\hwa@lines' for key 'hlines'
108 is not known}{The option hlines takes an argument to set which
109 hlines are drawn. Possible values are 'all','decreased' , 'header', and
110 'none'. 'all' is standard.}
111 }
112 }
113 \renewcommand{\hwa@hline@LONE}{~\\vspace{.5cm}}
114 }
115 \renewcommand{\hwa@hline@LTWO}{\vspace{.75cm}}
116 }

```

If tikz is Wanted, load Usefull Styles

```

117 \ifhwa@tikz
118 \RequirePackage{tikz}
119 \usetikzlibrary{shapes,arrows,positioning,decorations,
120 automata,backgrounds,petri,bending,
121 shapes.multipart}
122 \tikzset{
123 treenode/.style = {shape=circle, rounded corners,
124 draw, align=center},
125 graynode/.style = {fill=gray},
126 normalnode/.style = {treenode, font=\Large, bottom color=white},
127 array/.style = {rectangle split,
128 rectangle split horizontal,
129 rectangle split,
130 draw}
131 }
132 \fi

```

Make sure that this is the last Package loaded

```

133 \RequirePackage{geometry}

```

```

134 \ifhwa@twocolumn
135 \geometry{top=2cm, bottom=2cm, left=2cm,
136     headsep=14pt,hmarginratio={1:1}}
137 \else
138 \geometry{top=2cm, bottom=2cm, width=35em,
139     headsep=14pt,hmarginratio={4:3}}
140 \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.

```

141 \fancypagestyle{firstpage}{
142     %
143     \fancyhf{}
144     % clear all six fields
145     \renewcommand{\headrulewidth}{\hwa@headrulewidth}
146     \renewcommand{\footrulewidth}{0pt}
147     \fancyfoot[R]{\thepage}
148     \fancyhead[L]{\hwa@tutorium}
149     \fancyhead[R]{\@date } }
150 \fancypagestyle{followingpage}{
151     \fancyhf{}
152     \ifhwa@twoside % IF
153     \fancyhead[RO]{\@author}
154     \fancyhead[LO]{\hwa@kurs\
155         \hwa@tutorium}
156     \fancyhead[LE]{
157         \ifthenelse{\equal{\hwa@sheetTitle}{}}{\hwa@sheetTitle\\}
158         \GetTranslation{abgabe}: \hwa@abgabe
159     }
160     \fancyfoot[R0,LE]{\thepage}

```



```

161
162 \else %ELSE
163
164 \fancyhead[R]{\hwa@kurs\
165 \@author}
166 \fancyhead[L]{\hwa@tutorium\
167 \ifthenelse{\equal{\hwa@sheetTitle}{}}{\hwa@sheetTitle\}
168 \GetTranslation{abgabe}: \hwa@abgabe}
169 \fancyfoot[R]{\thepage}
170 \fi %ENDIF
171 \renewcommand{\headrulewidth}{\hwa@headrulewidth}
172 \renewcommand{\footrulewidth}{0pt}
173 }
174 \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.
175 `\renewcommand{\theequation}{\Roman{equation}}`

`\allowdisplaybreaks` Allow pagebreaks in Mathmode
176 `\allowdisplaybreaks`

4.3 fonts

4.4 Serife (Default)

4.4.1 San Serife

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.

```

177 \ifthenelse{\boolean{xetex}}{
178 \RequirePackage{fontspec}
179 \setsansfont{TeX Gyre Adventor}
180 \setmainfont{TeX Gyre Pagella}
181 \setmonofont{Fira Mono}
182 }{
183 \RequirePackage{tgadventor}
184 \RequirePackage{tgpagella}
185 \RequirePackage{FiraMono}
186 }

```

4.4.2 Monospace