

# THE EXSHEETS BUNDLE

v0.13      2014/05/11

the packages **EXSHEETS**, **EXSHEETS-LISTINGS**, **TASKS** and **CNTFORMATS**  
*or*

Yet another package for the creation of exercise sheets and exams.

Clemens NIEDERBERGER

<https://bitbucket.org/cgnieder/exsheets/>

[contact@mychemistry.eu](mailto:contact@mychemistry.eu)

**EXSHEETS** provides means to create exercises or questions and their corresponding solutions. The questions can be divided into classes and can be printed selectively. Meta-data to questions can be added and recovered.

The solutions may be printed where they are, can be collected and printed at a later point in the document altogether or section-wise or selectively by ID.

**EXSHEETS** provides a comprehensive interface for styling the headings of questions and solutions.

## Table of Contents

<b>I. Preliminaries</b>	<b>3</b>	5.2. Version v0.9i . . . . .	6
		5.3. Version 0.10 . . . . .	6
<b>1. Licence and Requirements</b>	<b>3</b>	5.4. Version 0.11 . . . . .	6
		5.5. Version 0.12 . . . . .	6
<b>2. Motivation</b>	<b>3</b>	5.6. Version 0.13 . . . . .	6
<b>3. Additional Packages</b>	<b>4</b>	<b>6. Thanks</b>	<b>6</b>
<b>4. Installation and Documentation</b>	<b>4</b>		
4.1. The <b>TASKS</b> Package . . . . .	5	<b>II. The <b>EXSHEETS</b> package</b>	<b>7</b>
4.2. The <b>CNTFORMATS</b> Package .	5		
4.3. The translations Package . . .	5	<b>7. Setup</b>	<b>7</b>
<b>5. News</b>	<b>5</b>	<b>8. Package Options</b>	<b>8</b>
5.1. Version 0.7 . . . . .	5		

<b>9. Create Questions/Exercises and their Solutions</b>	<b>9</b>	<b>19. Filling in the Blanks</b>	<b>35</b>
9.1. The question Environment . . . . .	9	19.1. Cloze . . . . .	35
9.2. Options to the question Environment . . . . .	11	19.2. Vertical Space for answers . . . . .	36
9.3. Subtitles to Questions . . . . .	12	<b>20. Styling your Exercise/Exam Sheets</b>	<b>37</b>
9.4. The solution Environment . . . . .	13	20.1. Background . . . . .	37
9.5. Options to the solution Environment . . . . .	13	20.2. The exsheets-headings Object	37
9.6. Setting the Counter . . . . .	14	20.2.1. Available Options . . . . .	38
9.7. Language Settings . . . . .	15	20.2.2. The 'block' Instance . . . . .	39
<b>10. Counting Points</b>	<b>15</b>	20.2.3. The 'runin' Instance . . . . .	41
10.1. The Commands . . . . .	15	20.2.4. The 'simple' Instance . . . . .	41
10.2. Options . . . . .	17	20.2.5. The 'empty' Instance . . . . .	42
<b>11. Printing Solutions</b>	<b>18</b>	20.2.6. The 'block-rev' Instance . . . . .	42
11.1. Print all . . . . .	19	20.2.7. The 'block-subtitle' Instance . . . . .	42
11.2. Print per chapter/section . . . . .	20	20.2.8. The 'block-wp' Instance . . . . .	43
11.3. Print by ID . . . . .	22	20.2.9. The 'block-wp-rev' Instance . . . . .	43
<b>12. Dividing Questions into Classes</b>	<b>23</b>	20.2.10. The 'block-nr' Instance . . . . .	44
12.1. Using Classes . . . . .	23	20.2.11. The 'block-nr-wp' Instance . . . . .	44
12.2. Using Topics . . . . .	24	20.2.12. The 'runin-rev' Instance . . . . .	44
12.3. Own Dividing Concepts . . . . .	25	20.2.13. The 'runin-wp' Instance . . . . .	45
12.4. Retrieving the Class Value in a Question . . . . .	26	20.2.14. The 'runin-wp-rev' Instance . . . . .	45
<b>13. Adding and Using Additional Information to Questions</b>	<b>26</b>	20.2.15. The 'runin-nr' Instance . . . . .	46
<b>14. Variations of an Exam</b>	<b>29</b>	20.2.16. The 'runin-fixed-nr' Instance . . . . .	46
<b>15. A Grade Distribution</b>	<b>30</b>	20.2.17. The 'runin-nr-wp' Instance . . . . .	47
<b>16. Selectively Include Questions from External Files</b>	<b>31</b>	20.2.18. The 'inline' Instance . . . . .	47
16.1. Caveat . . . . .	31	20.2.19. The 'inline-wp' Instance . . . . .	47
16.2. How it works . . . . .	32	20.2.20. The 'inline-nr' Instance . . . . .	48
<b>17. The <code>auto-label</code> Option</b>	<b>33</b>	20.2.21. The 'centered' Instance . . . . .	48
<b>18. Own Question/Solution Pairs</b>	<b>34</b>	20.2.22. The 'centered-wp' Instance . . . . .	49
		20.2.23. The 'margin' Instance . . . . .	49
		20.2.24. The 'margin-nr' Instance . . . . .	50
		20.2.25. The 'raggedleft' Instance . . . . .	50
		20.2.26. The 'fancy' Instance . . . . .	50
		20.2.27. The 'fancy-wp' Instance . . . . .	51
		20.3. Load Custom Configurations . . . . .	52

<b>III. The <b>ExSHEETS-LISTINGS</b> Package v0.2</b>	<b>52</b>	Solution 10. . . . .	54
<b>21. The Problem</b>	<b>52</b>	Fancy name 11. . . . .	54
<b>22. The Proposed Solution</b>	<b>52</b>	Solution 18. . . . .	54
<b>23. Own Environments</b>	<b>54</b>	Solution 19. . . . .	54
		Solution 20. . . . .	54
		Solution 27. . . . .	54
		Solution 28. . . . .	55
		★ Solution 29. . . . .	55
		Solution 30. . . . .	55
<b>IV. Appendix</b>	<b>54</b>		
<b>A. A List of all Solutions used in this Manual</b>	<b>54</b>	<b>B. Bibliography</b>	<b>55</b>
Solution 9. . . . .	54	<b>C. Index</b>	<b>57</b>

# Part I.

## Preliminaries

### 1. Licence and Requirements

Permission is granted to copy, distribute and/or modify this software under the terms of the L<sup>A</sup>T<sub>E</sub>X Project Public License (LPPL), version 1.3 or later (<http://www.latex-project.org/lppl.txt>). The software has the status “maintained.”

**ExSHEETS** loads and needs the following packages: l3kernel<sup>1</sup> [Tea13b], xparse, xtemplate, l3keys2e<sup>2</sup> [Tea13c], l3sort<sup>3</sup> [Tea13a], xcolor<sup>4</sup> [Kero7], ulem<sup>5</sup> [Ars11], etoolbox<sup>6</sup> [Leh11], environ<sup>7</sup> [Rob13], and pgfcore<sup>8</sup> [Tan10]. **ExSHEETS** calls `\normalem` (from the ulem package).

### 2. Motivation

There are already quite a number of packages that allow the creation of exercise sheets or written exams. Just to name the most common ones: eqexam [Sto11], exam [Hir11], examdesign [Ale01], exercise [Pic12], probsoln [Tal12], answers [Pif10], esami [MV13], exsol [Dae13] (and many more ...).

- 
1. on CTAN as l3kernel: <http://mirrors.ctan.org/macros/latex/contrib/l3kernel/>
  2. all three on CTAN as l3packages: <http://mirrors.ctan.org/macros/latex/contrib/l3packages/>
  3. on CTAN as l3experimental: <http://mirrors.ctan.org/macros/latex/contrib/l3experimental/>
  4. on CTAN as xcolor: <http://mirrors.ctan.org/macros/latex/contrib/xcolor/>
  5. on CTAN as ulem: <http://mirrors.ctan.org/macros/latex/contrib/ulem/>
  6. on CTAN as etoolbox: <http://mirrors.ctan.org/macros/latex/contrib/etoolbox/>
  7. on CTAN as environ: <http://mirrors.ctan.org/macros/latex/contrib/environ/>
  8. on CTAN as pgf: <http://mirrors.ctan.org/graphics/pgf/>

### 3. Additional Packages

One thing I missed in all packages that I’ve tried out<sup>9</sup> was a high flexibility in choosing which questions and solutions should be printed, where which solutions should be printed and so on, combined with the possibility to assign questions to different classes so one could for example create two versions of an exam out of the box. And – I can’t get enough – I also want to be able to use/design different layouts for questions additional to a standard section-like format. All these points are realized in **ExSHEETS**.

Additionally one should be able to assign some sort of meta-data to questions that of course should be easily reusable. How this can be done is explained in section 13.

Then there is – at least in Germany – the habit of having lists of exercises aligned in columns but counting from the left to the right instead from up to down. **ExSHEETS** provides a possibility for that (see the **TASKS** package). I am not quite content with it as it works now, though.<sup>10</sup>

On the other hand **ExSHEETS** doesn’t – and probably won’t – offer a real possibility for creating multiple choice questions. As a fact it doesn’t provide many (if any) means to specify the *type* of question or the structure. If these are your needs take a look at examdesign [Aleo1], for example. Or exploit the possibilities enumitem [Bez11] gives you.

I had the idea for this package in 2008. Back then my T<sub>E</sub>X skills were by far not good enough to write it. Actually, even today I wouldn’t have been able to realize it without all the l<sub>3</sub> packages like l<sub>3</sub>kernel and l<sub>3</sub>packages. I actively began to develop **ExSHEETS** in spring 2011 but it wasn’t until now (September 2012) that I consider it stable enough for wider usage. At the time of writing (May 11, 2014) there still are probably lots of rough edges let alone bugs so I am very interested in all kinds of feedback.

### 3. Additional Packages

**ExSHEETS** actually bundles four packages: **ExSHEETS**, **ExSHEETS-LISTINGS**, **TASKS** and **CNTFORMATS**. **ExSHEETS-LISTINGS** is an add-on to **ExSHEETS** that offers some functionality to use listings with **ExSHEETS**. It is presented in part III.

The **TASKS** package and the **CNTFORMATS** package have their own documentation. These packages provide functionality that is used by **ExSHEETS**. They can, however, be used independently from **ExSHEETS**.

The package **CNTFORMATS** is probably not really useful on a user-level but maybe for package writers.

**ExSHEETS** used to bundle the translations package, too, but doesn’t any more. You can find the translations package as a package of it’s own on the Comprehensive T<sub>E</sub>X Archive Network (CTAN).

### 4. Installation and Documentation

If you install **ExSHEETS** manually beware to put the files

---

9. Well, probably I didn’t try hard enough...

10. There are still other possibilities, for example take a look here: <http://tex.stackexchange.com/questions/67966/enumerate-in-multicols> or at the multienum package [Kleo5].

## 5. News

`exsheets_headings.def`

`exsheets_headings.cfg`

in the same directory as the `exsheets.sty` file.<sup>11</sup> You *can* install the other packages, **TASKS** and **CNTFORMATS**, in different locations but since they belong to **EXSHEETS** they probably should be placed in the same directory.

You should put the file `tasks.cfg` in the same directory as the `tasks.sty` file.

As with every manual package installation you need to make sure to put the files in a directory where  $\text{\TeX}$  can find them and afterwards update the database.

### 4.1. The **TASKS** Package

Introduced in  
version 0.9a

The **TASKS** package has got its own documentation – `tasks_en.pdf`. Please read that file for details on the package.

### 4.2. The **CNTFORMATS** Package

Introduced in  
version 0.5

The **CNTFORMATS** package has got its own documentation – `cntformats_en.pdf`. Please read that file for details on the package.

### 4.3. The translations Package

Changed in  
version 0.9i

The translations package [Nie13] used to be part of the **EXSHEETS** bundle but is a package of its own now and released independently. You can find it as every other package on CTAN and in a full  $\text{\TeX}$  Live or MiK $\text{\TeX}$  installation.

## 5. News

### 5.1. Version 0.7

With version 0.7 there has been a potentially breaking change: the `tasks` environment previously provided by **EXSHEETS** has been extracted into a package of its own. This does not change any syntax *per se*. However, if you used custom settings then you'll probably run into some problems. The options for the environment are no longer set with `\SetupExSheets` but with `\settasks`. Also the object that is used for the list template and its instances has been renamed from `exsheets-tasks` into `tasks`.

What's probably even more of a breaking change is a syntax difference of the `tasks` environment: the optional argument for the number of columns is *no longer set in braces but parentheses*. This is deliberate as it reflects the optional nature of the argument better and is consistent with the syntax of `\NewTasks`, too.

Additionally the labels of the list got an additional offset of `1ex` from the items which will lead to slightly different output. In some cases this might actually lead to the most annoying changes. In this case say `\settasks{label-offset=0pt}` which should cure things again.

---

<sup>11</sup>. That is, a directory like `texmf-local/tex/latex/exsheets`, probably

## 6. Thanks

I am very sorry for any inconvenience! I am trying to keep such changes as minimal and rare as possibly. However, it is not always avoidable when a package is new and still a child. It will grow up eventually.

**ExSHEETS'** other packages – **TASKS** and **CNTFORMATS** – have gotten their own documentation which are essentially extracted from this very document you're reading now. This manual contains links to the respective manuals.

### 5.2. Version v0.9i

The translations package [Nie13] is no longer part of the **ExSHEETS** bundle. From now on (July 17. 2013) it is provided as a package of its own.

### 5.3. Version 0.10

The **ExSHEETS** family has got a new member: **ExSHEETS-LISTINGS**. This package proposes a solution for the problem of using verbatim material in **ExSHEETS'** question and solution environments. It is presented in part III.

Question now can get subtitles that are printed if the heading instance supports it, see section 9.3.

### 5.4. Version 0.11

The commands `\GetQuestionClass` and `\PrintQuestionClassTF` have been added. They're explained in section 12.4.

### 5.5. Version 0.12

The `auto-label` is now more flexible to allow the use together with packages `cleveref`.

Question properties can now be retrieved before the question is printed (by writing the properties to the aux file).

### 5.6. Version 0.13

New options:

- `chapter-hook` allows to add code to the list of solutions when the solutions of a new chapter are printed, see section 11.1.
- `section-hook` allows to add code to the list of solutions when the solutions of a new section are printed, see section 11.1.

## 6. Thanks

I need to thank the many users who gave me feedback so far! For one thing this shows me that **ExSHEETS** is useful to people. It also led to many improvements like new features and countless bug fixes.

## Part II.

# The **ExSHEETS** package

### 7. Setup

The **ExSHEETS** package has three different types of options, kind of. The first type are the classic package options which are used when you load **ExSHEETS**:

```
1 \usepackage[<options>]{exsheets}
```

These options are described in section 8.

The second type are options that belong to a specific environment or command. These options are either used directly with the environment/command

```
1 \begin{env}[<options>]
2   ...
3 \end{env}
```

or can be set with the setup command:

```
\SetupExSheets[<module>]{<options>}
```

The options of the second type all belong to **modules**. Let's say you want to specify some options of the question environment. You can then say the following:

```
1 \SetupExSheets[question]{option1,option2=value2}
2 % OR:
3 \SetupExSheets{question/option1,question/option2=value2}
```

The **module** an option belongs to is written in the left margin next to the when the option is described.

The third type aren't options at all, actually. However, thanks to the great xtemplate package you are able to define your own instances of some of the objects used by **ExSHEETS**. This is explained in a little more detail in part 20 on page 37 ff. This third type, however, brings in a possible instability: the xtemplate package is in an experimental and developing state. This means that the syntax of the package may and possibly will change sometime in the future. I cannot foresee what any consequences of that will be for **ExSHEETS**.

## 8. Package Options

The package **ExSHEETS** has some options, namely the following ones:

- counter-format** =  $\{\langle counter-format \rangle\}$  Default: qu.  
 Formatting of the counter of the questions. This option takes a special kind of string that is described in section 9.6.
- counter-within** =  $\{\langle counter \rangle\}$  (initially empty)  
 Resets the question counter with every step of  $\langle counter \rangle$ .
- auto-label** = true|false Default: false  
 If set to true **ExSHEETS** will automatically place a `\label{qu:\langle id \rangle}` for each question. See section 17 for ways to customize this. It will also create the question properties ref and pageref, see section 13 for more on this.
- headings** =  $\{\langle instance \rangle\}$  Default: block  
 Choose the style of the questions' and solutions' headings. There are two predefined styles: block and runin.
- headings-format** =  $\{\langle code \rangle\}$  Default: `\normalsize\bfseries`  
 This code is placed immediately before the headings of the questions and solutions.
- subtitle-format** =  $\{\langle code \rangle\}$  Default: `\normalsize\itshape`  
 This code is placed immediately before the subtitle of the questions and solutions. It only has an effect with a title instance that uses the subtitle coffin, see section 20.2.
- load-headings** = true|false Default: false  
 Loads additional styles for the headings. More on this is described in section 20.2.
- load-tasks** = true|false Default: false  
 Loads additional styles for the tasks environment. See the documentation of the **TASKS** package.
- totoc** = true|false Default: false  
 This option adds the questions and solutions with their names and numbers to the table of contents.
- questions-totoc** = true|false Default: false  
 This option adds the questions with their names and numbers to the table of contents.
- solutions-totoc** = true|false Default: false  
 This option adds the solutions with their names and numbers to the table of contents.
- toc-level** =  $\{\langle toc level \rangle\}$  Default: subsection  
 This option sets the level in which questions and solutions should appear in the table of contents.
- questions-toc-level** =  $\{\langle toc level \rangle\}$  Default: subsection  
 This option sets the level in which questions should appear in the table of contents.



`solutions-toc-level = {\<toc level\}}` Default: subsection  
This option sets the level in which solutions should appear in the table of contents.

`use-ref = true|false` Default: false  
enable referencing to sections and chapters in a way that the references can be used with `\printsolutions`, see section 11.2 for details.

The toc options are demonstrated with section A and the solutions printed there being listed in the table of contents.

## 9. Create Questions/Exercises and their Solutions

Now, let's start with the most important part: the questions and (possibly) their respective solutions.

### 9.1. The question Environment

Questions are written inside the question environment:

`\begin{question}[\<options\>]{\<points\>}`

The main environment: creates a new exercise/question. Both arguments are optional!

```
1 \begin{question}
2   This is our very first very difficult to solve question!
3 \end{question}
```

#### Exercise 1.

This is our very first very difficult to solve question!

As you can see a heading is automatically created and the question is numbered. You can of course change both the numbering and the naming, but more on that later.

The question environment takes an optional argument `{\<points\>}` that can be used to assign points to the question (as is common in written exams):

```
1 \begin{question}{3}
2   This is our first difficult question that is worth 3 points!
3 \end{question}
```

#### Exercise 2.

This is our first difficult question that is worth 3 points!

3 P.

## 9. Create Questions/Exercises and their Solutions

These points are saved internally (see section 10 for reasons why) and are written to the right margin next to the question heading in the default setting.

You can also assign bonus points by inserting  $\langle point \rangle + \langle bonus points \rangle$  as argument.

```

1 \begin{question}{1+1}
2   This question is worth 1 point and 1 bonus point.
3 \end{question}
4 \begin{question}{+3}
5   This question is a bonus question. It is worth 3 bonus points.
6 \end{question}

```

### Exercise 3.

This question is worth 1 point and 1 bonus point.

1 (+1) P.

### Exercise 4.

This question is a bonus question. It is worth 3 bonus points.

(+3 P.)

The points are counted and added to the total sum of points, see section 10 for details on this. Should you want that the points of a specific question *should not be added* to the total sum then precede it with a bang !:

```

1 \begin{question}{!3}
2   This question's points won't be added to the total sum.
3 \end{question}

```

### Exercise 5.

This question's points won't be added to the total sum.

3 P.

Beware that this also prevents bonus points. The points simply will be written where the heading instance puts them.

On additional thing: you might want to define custom commands that should behave differently if they're inside or outside of the question environment. In this case you can use these commands:

\* `\IfInsideQuestionTF{ $\langle true code \rangle$ }{ $\langle false code \rangle$ }`

Check if inside of a question and either leave  $\langle true code \rangle$  or  $\langle false code \rangle$  in the input stream.

\* `\IfInsideQuestionT{ $\langle true code \rangle$ }`

Check if inside of a question and either leave  $\langle true code \rangle$  in the input stream if true.

\* `\IfInsideQuestionF{ $\langle false code \rangle$ }`

Check if inside of a question and either leave  $\langle false code \rangle$  in the input stream if not.

Introduced in  
version 0.12

Introduced in  
version 0.3

## 9.2. Options to the question Environment

The question environment takes one or more of the following options:

- question** » **type** = exam|exercise Default: exercise  
 Determines the type of question and changes the default name of a question from “Exercise” to “Question”. These default names are language dependent.  
 If you use `\usepackage[⟨ngerman⟩]{⟨babel⟩}`, for example, then the names are “Übung and “Aufgabe”.
- question** » **name** = {⟨name⟩} (initially empty)  
 Sets a custom name. All predefined names are discarded.
- question** » **subtitle** = {⟨subtitle⟩} (initially empty)  
 Adds a subtitle ⟨subtitle⟩ for the question that is used by headings instances that make use of the subtitle coffin, see section 20.2.
- question** » **print** = true|false Default: true  
 Prints or hides the question.
- question** » **ID** = {⟨id⟩} (initially empty)  
 Assigns a custom ID to the question. See section 11.3 for further information.
- question** » **label** = {⟨label⟩} (initially empty)  
 Places a `\label{⟨label⟩}` for the question. This will overwrite any label that is placed by the `auto-label` option.
- question** » **class** = {⟨class⟩} (initially empty)  
 Assigns a class ⟨class⟩ to the question. See section 12.1 for further information.
- question** » **topic** = {⟨topic⟩} (initially empty)  
 Assigns a topic ⟨topic⟩ to the question. See section 12.2 for further information.
- question** » **use** = true|false Default: true  
 Discards the question. Or not.

```

1 \begin{question}[type=exam]
2   This question has the type \keyis{type}{exam}. The default name has changed
3   from ‘‘Exercise’’ to ‘‘Question’’.
4 \end{question}
5 \begin{question}[name=Fancy name]
6   This question has a custom name.
7 \end{question}
8 \begin{question}[print=false]
9   This question is not printed.
10 \end{question}

```

**Question 6.**

This question has the type `type = {exam}`. The default name has changed from “Exercise” to “Question”.

**Fancy name 7.**

This question has a custom name.

The difference between `print` and `use` lies behind the scenes: with `print = {false}` the question is not printed, but it still gets an individual ID, is numbered, and a possible solution is saved. This is for example useful when you want to print a sample solution for an exam. With `use = {false}` it is fully discarded which means it is not accessible through an ID and a possible solution will not be saved.

**9.3. Subtitles to Questions**

The `subtitle` option mentioned in section 9.2 can be used to add a subtitle to a question. However, unless you choose a suitable heading (see section 20.2) it won't be printed. Currently there is *one* heading instance that uses the subtitles but it should be easy to create a custom heading using one of the existing ones as a starter example. When creating such a heading you may want to distinguish between the cases when a subtitle has been given and when no subtitle is present. This can be done with the following commands:

\* `\IfQuestionSubtitleTF{⟨true code⟩}{⟨false code⟩}`

Tests if the current question has a subtitle. Leaves either `⟨true code⟩` or `⟨false code⟩` in the input stream.

\* `\IfQuestionSubtitleT{⟨true code⟩}`

Tests if the current question has a subtitle. Leaves `⟨true code⟩` in the input stream if it has.

\* `\IfQuestionSubtitleF{⟨false code⟩}`

Tests if the current question has a subtitle. Leaves `⟨false code⟩` in the input stream if it hasn't.

A subtitle is also a property of a question in the sense of section 13. That means if a subtitle is given it can be retrieved with `\GetQuestionProperty`.

As an example you could define your own heading instance that prints the ID of a question and (if given) the subtitle:

```

1 \DeclareInstance{exsheets-heading}{QE}{default}{
2   join = {
3     title[r,B]number[l,B](.333em,0pt) ;
4     title[r,B]subtitle[l,B](1em,0pt)
5   } ,
6   attach = {
7     main[l,vc]title[l,vc](0pt,0pt) ;
8     main[r,vc]points[l,vc](\marginparsep,0pt)
9   } ,
10  subtitle-post-code = {ID: \CurrentQuestionID} ,

```

```

11   number-post-code   = {\IfQuestionSubtitleF{ID: \CurrentQuestionID}}
12 }

```

Please see section 20.2 for more details on heading instances.

#### 9.4. The solution Environment

If you want to save/print (more on the exact usage in section 11) a solution you have to use the solution environment *after* the question it belongs to and *before* the next question.

`\begin{solution}[\langle options \rangle]`

The main environment for adding solutions to exercises/questions.

```

1 \begin{question}[ID=first]\label{qu:question_with_solution}
2   This is our first question that gets a solution!
3 \end{question}
4 \begin{solution}
5   This is the solution to exercise~\ref{qu:question_with_solution}!
6 \end{solution}

```

##### Exercise 9.

This is our first question that gets a solution!

You can see that in the default settings the solution is *not* written to the document. It has been saved, though, for possible later usage. We will see the solution later!

#### 9.5. Options to the solution Environment

The solutions environment also has options, namely these:

`solution » name = {\langle name \rangle}` (initially empty)  
Sets a custom name.

`solution » print = true|false` Default: false  
Prints or hides the solution.

Their meaning is the same as those for the question environment.

```

1 \begin{question}{5}
2   The solution to this questions gets printed where it is.
3 \end{question}
4 \begin{solution}[print]
5   See? This solution gets printed where you have put it in the code of
6   your document.
7 \end{solution}

```

```

8 \begin{question}{2.5}
9   The solution to this questions gets printed where it is \emph{and}
10  has a fancy name. Have you noticed that you can assign partial
11  points?
12 \end{question}
13 \begin{solution}[print,name=Fancy name]
14   See? This solution gets printed where you have put it and has a fancy
15   name!
16 \end{solution}

```

**Exercise 10.**

5 P.

The solution to this questions gets printed where it is.

**Solution 10.**

See? This solution gets printed where you have put it in the code of your document.

**Exercise 11.**

2.5 P.

The solution to this questions gets printed where it is *and* has a fancy name. Have you noticed that you can assign partial points?

**Fancy name 11.**

See? This solution gets printed where you have put it and has a fancy name!

## 9.6. Setting the Counter

The package option `counter-format` allows you to specify how the question counter (a counter unsurprisingly name question) is formatted.

The input is an arbitrary string which means you can have anything as counter number. However, the letter combinations ch, se, qu and tsk are replaced with the counters for the chapter, section, question or tasks (see the `TASKS` package), respectively. While the last one is not really useful in this case the others allow for a combined numbering. Each of these letter combinations can have an optional argument that specifies the format of the respective counter. 1: `\arabic`, a: `\alph`, A: `\Alph`, r: `\roman` and R: `\Roman`.

```

1 \SetupExSheets{counter-format=Nr~se~(qu[a])}
2 \begin{question}
3   A question with a differently formatted number.
4 \end{question}

```

**Exercise Nr 9 (I)**

A question with a differently formatted number.

Since the strings associated with the counters are replaced one has to hide them if they are

actually wanted in the counter format. The easiest way would to hide them in braces.

```
1 \SetupExSheets{counter-format={section}\,se~{question}\,(qu[a])}
2 \begin{question}
3   A question with a yet differently formatted number.
4 \end{question}
```

---

#### Exercise section 9 question (m)

A question with a yet differently formatted number.

### 9.7. Language Settings

The names of the questions and solutions are language dependent. If you use babel or polyglossia **ExSHEETS** will adapt to the document language. **ExSHEETS** has a number of translations but surely not all! If you miss a language please drop me a line in an email<sup>12</sup> containing the babel language name and the correct translations for questions (possibly distinguishing between exercises and exam questions) and solutions.

Until I implement it you can add something like this to your preamble (example for Danish) and try if it works:

```
1 \DeclareTranslation{Danish}{exsheets-exercise-name}{\0{}}velse}
2 \DeclareTranslation{Danish}{exsheets-question-name}{Opgave}
3 \DeclareTranslation{Danish}{exsheets-solution-name}{Opl\u{}}sning}
```

If this isn't working it means that the language you're using is unknown to the translations package. In this case please notify me, too. You then can still use the **name** options.

## 10. Counting Points

### 10.1. The Commands

You have seen in section 9.1 that you can assign points to a question. If you do so these points are printed into the margin<sup>13</sup> and are counted internally. But there are additional commands to assign points or bonus points and a number of commands to retrieve the sum of points and/or bonus points.

**\addpoints\*{<num>}**

This command can be used to add points assigned to subquestions. **\addpoints** will print the points (with "unit") *and* add them to the sum of all points, **\addpoints\*** will only add them but print nothing.

---

12. [contact@mychemistry.eu](mailto:contact@mychemistry.eu)

13. Well, not necessarily. It depends on the heading style you have chosen.

## 10. Counting Points

`\points*{⟨num⟩}`

This command will only print the points (with “unit”) but won’t add them to the sum of points.

`\addbonus*{⟨num⟩}`

This command can be used to add bonus points assigned to subquestions. `\addbonus` will print the points (with “unit”) *and* add them to the sum of all bonus points, `\addbonus*` will only add them but print nothing.

`\bonus*{⟨num⟩}`

This command will only print the bonus points (with “unit”) but won’t add them to the sum of bonus points.

`\pointssum*`

Prints the sum of all points with or without (starred version) “unit”: 64.75 P.

`\currentpointssum*`

Prints the current sum of points with or without (starred version) “unit”: 11.5 P.

`\bonussum*`

Prints the sum of all bonus points with or without (starred version) “unit”: 4 P.

`\currentbonussum*`

Prints the current sum of bonus points with or without (starred version) “unit”: 4 P.

`\totalpoints*`

prints the sum of the points *and* the sum of the bonus points with “unit”: 64.75 (+4) P. The starred version prints the sum of the points without “unit”: 64.75 (+4).

The commands `\pointssum`, `\bonussum` and `\totalpoints` need at least *two* L<sup>A</sup>T<sub>E</sub>X runs to get the sum right.

Suppose you have an exercise worth 4 P. which consists of four questions listed with an `enumerate` environment that are all worth 1 P. each. You have two possibilities to display and count them:

```
1 % uses package 'enumitem'
2 \begin{question}{4}
3   \begin{enumerate}[label=\alph*]
4     \item blah (\points{1})
5     \item blah (\points{1})
6     \item blah (\points{1})
7     \item blah (\points{1})
8   \end{enumerate}
9 \end{question}
10 \begin{question}
11   \begin{enumerate}[label=\alph*]
12     \item blah (\addpoints{1})
13     \item blah (\addpoints{1})
14     \item blah (\addpoints{1})
```



```

15 \item blah (\addpoints{1})
16 \end{enumerate}
17 \end{question}

```

---

**Exercise 14.**

4 P.

- a) blah (1 P.)
- b) blah (1 P.)
- c) blah (1 P.)
- d) blah (1 P.)

**Exercise 15.**

- a) blah (1 P.)
- b) blah (1 P.)
- c) blah (1 P.)
- d) blah (1 P.)

**10.2. Options**

**points** » **name** = {*<name>*} Default: P.

Choose the “unit” for the points. If you like to differentiate between a single point and more than one point you can give a plural ending separated with a slash: **name** = {point/s}. This sets also the name of the bonus points.

**points** » **name-plural** = {*<plural form of name>*} (initially empty)

Instead of forming the plural form with an ending to the singular form this option allows to set an extra word for it. This sets also the plural form for the bonus points.

**points** » **bonus-name** = {*<name>*} Default: P.

Choose the “unit” for the bonus points. If you like to differentiate between a single point and more than one point you can give a plural ending separated with a slash: **bonus-name** = {*<point/s>*}.

**points** » **bonus-plural** = {*<plural form of name>*} (initially empty)

Instead of forming the plural form with an ending to the singular form this option allows to set an extra word for it.

**points** » **use-name** = true|false Default: true

Don't display the name at all. Or do.

**points** » **format** = {*code*} Default: \@firtsofone  
 Introduced in version 0.9d      Format number plus name as a whole. Ideally *code* would end with a command that takes an argument. Else number plus name will be braced.

**points** » **number-format** = {*any code*} (initially empty)  
 This option allows formatting of the number, e. g., italics: **number-format** = {\textit}.

**points** » **bonus-format** = {*any code*} (initially empty)  
 This option allows formatting of the number of the bonus points, e. g., italics: **bonus-format** = {\textit}.

**points** » **parse** = true | false Default: true  
 If set to false the points are not counted and the \totalpoints, \pointssum and \bonusum commands won't know their value.

**points** » **separate-bonus** = true | false Default: false  
 This option determines whether points and bonus points each get their own unit when they appear together (in the margin or with \totalpoints).

**points** » **pre-bonus** = {*tokens*} Default: \space(+  
 Code to be inserted before the bonus points when they follow normal points.

**points** » **post-bonus** = {*tokens*} Default: )  
 Code to be inserted after the bonus points when they follow normal points.

```

1 \SetupExSheets[points]{name=point/s,number-format=\color{red}}
2 \begin{question}{1}
3   This one's easy so only 1 point can be earned.
4 \end{question}
5 \begin{question}{7.5}
6   But this one's hard! 7.5 points are in there for you!
7 \end{question}

```

#### Exercise 16.

This one's easy so only 1 point can be earned.

1 point

#### Exercise 17.

But this one's hard! 7.5 points are in there for you!

7.5 points

## 11. Printing Solutions

You have already seen that you can print solutions where they are using the **print** option. But **EXSHEETS** offers you quite more possibilities.

In the next subsections the usage of the following command is discussed.

`\printsolutions[⟨setting⟩]`

Print solutions of questions(exercises).

Before we do that a hint: remember that you can set the option `print = {⟨g⟩}`lobally:

```
1 % in the preamble
2 \SetupExSheets{solution/print=true}
```

Now if you want to typeset some text depending on the option being true or not you can use the following commands:

\* `\PrintSolutionsTF{⟨true code⟩}{⟨false code⟩}`

Checks if inside of a solution environment and either leaves the `⟨true code⟩` or the `⟨false code⟩` in the input stream.

\* `\PrintSolutionsT{⟨true code⟩}`

Checks if inside of a solution environment and either leaves the `⟨true code⟩` in the input stream if yes.

\* `\PrintSolutionsF{⟨false code⟩}`

Checks if inside of a solution environment and either leaves the `⟨false code⟩` in the input stream if not.

They might come in handy if you want two versions of an exercise sheet, one with the exercises and one with the solutions, and you want to add different titles to these versions, for instance.

### 11.1. Print all

The first and easiest usage of `\printsolutions` is the following:

```
1 \printsolutions
```

There is nothing more to say, really. It prints all solutions you have specified except those belonging to a question with option `use = {false}`. Yes, there's one more point: `\printsolutions` only knows the solutions that have been set *before* its usage! This is also true for every usage explained in the next sections.

```
1 \printsolutions
```

---

#### **Solution 9.**

This is the solution to exercise 9!

**Solution 10.**

See? This solution gets printed where you have put it in the code of your document.

**Fancy name 11.**

See? This solution gets printed where you have put it and has a fancy name!

Two options allow to add code to the list of solutions when used with `\printsolutions[all]` (which is the same as using it without option):

`chapter-hook = {⟨code⟩}`

Introduced in  
version 0.13

Adds `⟨code⟩` to the list of solutions every time solutions from a new chapter are printed (before the solutions of the corresponding chapter are printed).

`section-hook = {⟨code⟩}`

Introduced in  
version 0.13

Adds `⟨code⟩` to the list of solutions every time solutions from a new section are printed (before the solutions of the corresponding section are printed).

**11.2. Print per chapter/section****Current chapter/section**

If you are not creating an exercise sheet or an exam but are writing a textbook you maybe want a section at the end of each chapter showing the solution to the exercises presented in that chapter. In this case use the command as follows:

```
1 \printsolutions[section]
2 % or
3 \printsolutions[chapter]
```

Again, this is pretty much self-explaining. The solutions to the questions of the current chapter<sup>14</sup> or section are printed.

```
1 \begin{question}
2   This is the first and only question in this section.
3 \end{question}
4 \begin{solution}
5   This will be one of a few solutions printed by the following call of
6   \cs{printsolutions}.
7 \end{solution}
8 And now:
9 \printsolutions[section]
```

---

<sup>14</sup> Only if the document class you're using *has* chapters, of course!

**Exercise 18.**

This is the first and only question in this section.

And now:

**Solution 18.**

This will be one of a few solutions printed by the following call of `\printsolutions`.

**Specific chapter/section**

You can also print only the solutions from chapters or sections other than the current ones. The syntax is fairly easy:

```
1 \printsolutions[section={1-7,10}]
2 % the same for chapters:
3 % \printsolutions[chapter={1-7,10}]
```

---

Don't forget that `\printsolutions` cannot know the solutions from section 10 yet. It is just used to demonstrate the syntax. You can also use an open range, *e. g.*, something like

```
1 \printsolutions[section={-4,10-}]
```

This would print the solutions from sections 1–4 and from all sections with number 10<sup>15</sup> and greater.

There is an obvious disadvantage: you have to know the section numbers! But there is a solution: use the package option `use-ref = {true}`. Then you can do something like

```
1 % in the preamble:
2 \usepackage{use-ref}{exsheets}
3 % somewhere in your code after \section{A really cool section title}:
4 \label{sec:ReallyCool}
5 % somewhere later in your code:
6 \printsolutions[section={-\S{sec:ReallyCool}}]
7 % which will print all solutions from questions up to and
8 % including the really cool section
```

With the package option `use-ref = {true}` each usage of `\label` will create additional labels (one preceded with `exse:` and another one with `exch:`) which store the section number and the chapter number, respectively. These are used internally by two commands `\S` and `\C` which

---

15. Or rather where `\value{section}` is 10 or greater – the actual counter formatting is irrelevant.

refer to the section number and the chapter number the label was created in. *These commands are only available as arguments of `\printsolutions`.*

Since some packages like the well known `hyperref` for example redefine `\label` `use-ref` won't work in together with it. In this case don't use `use-ref` and set `\exlabel{<label>}` instead to remember the section/the chapter number. Its usage is just like `\label`. So the safest way is as follows:

```

1 % in the preamble:
2 \usepackage{exsheets}
3 % somewhere in your code after \section{A really cool section title}:
4 \exlabel{sec:ReallyCool}
5 % somewhere later in your code:
6 \printsolutions[section={-\S{sec:ReallyCool}}]
7 % which will print all solutions from questions up to and
8 % including the really cool section

```

Please be aware that the labels must be processed in a previous  $\text{\LaTeX}$  run before `\S` and `\C` can pass them on to `\printsolutions`.

### 11.3. Print by ID

Now comes the best part: you can also print selected solutions! Every question has an ID. To see which ID a question has you can call the following command:

`\DebugExSheets{true|false}`

Enable or disable visual `EXSHEETS`' debugging.

#### \* `\CurrentQuestionID`

Expands to the current question ID.

Introduced in  
version 0.4a

Let's create some more questions and take a look what this command does:

```

1 \DebugExSheets{true}
2 \begin{question}[ID=nice!]
3   A question with a nice \acs{id}!
4 \end{question}
5 \begin{solution}
6   The solution to the question with the nice \acs{id}.
7 \end{solution}
8 \begin{question}{3.75}
9   Yet another question. But this time with quarter points!
10 \end{question}
11 \begin{solution}
12   Yet another solution.
13 \end{solution}

```

ID: nice!

**Exercise 19.**

A question with a nice ID!

ID: 20

**Exercise 20.**

Yet another question. But this time with quarter points!

3.75 P.

So now we can call some specific solutions:

```
1 \printsolutions[byID={first,nice!,10,14}]
```

**Solution 9.**

This is the solution to exercise 9!

**Solution 10.**

See? This solution gets printed where you have put it in the code of your document.

**Solution 19.**

The solution to the question with the nice ID.

This makes use of the `l3sort` package which at the time of writing is still considered experimental. In case you wonder where solution 14 is: question 14 has no solution given.

If you don't want that the solutions are sorted automatically but appear in the order given you can use the option

`solution » sorted = true|false`

Default: true

Sort solutions given by ID or don't.

## 12. Dividing Questions into Classes

### 12.1. Using Classes

For creating different variants of a written exam or different difficulty levels of an exercise sheet it comes in handy if one can assign certain classes to questions and then tell `ExSHEETS` only to use one or more specific classes.

`use-classes = {⟨list of classes⟩}`

(initially empty)

When this option is used only the questions belonging to the specified classes are printed and have their solutions saved.

```

1 \SetupExSheets{use-classes={A,C}}
2 \begin{question}[class=A]
3   Belonging to class A.
4 \end{question}
5 \begin{question}[class=B]
6   Belonging to class B.
7 \end{question}
8 \begin{question}[class=C]
9   Belonging to class C!
10 \end{question}

```

---

**Exercise 21.**

Belonging to class A.

**Exercise 22.**

Belonging to class C!

Questions of classes that are not used are fully discarded. *This also means that questions that don't have a class assigned are discarded.*

**12.2. Using Topics**

Similarly to classes one can assign topics to questions. The usage is practically identical, the semantic meaning is different.

`use-topics = {⟨list of topics⟩}` (initially empty)

When this option is used only the questions belonging to the specified topics are printed and have their solutions saved.

```

1 \SetupExSheets{use-topics={trigonometry}}
2 \begin{question}[topic=trigonometry]
3   A trigonometry question.
4 \end{question}
5 \begin{question}[topic=arithmetics]
6   A arithmetics question
7 \end{question}

```

---

**Exercise 23.**

A trigonometry question.

Questions of topics that are not used are fully discarded. *This also means that questions that don't have a topic assigned are discarded.*



If you set both `use-classes` and `use-topics` then only questions will be used that *match both categories*.

Ideally one could assign more than one topic to a question but this is *not* supported yet.

### 12.3. Own Dividing Concepts

Actually both classes and topics are introduced into `ExSHEETS` internally this way:

```
1 \DeclareQuestionClass{class}{classes}
2 \DeclareQuestionClass{topic}{topics}
```

which means you can do the same introducing your own dividing concepts.

`\DeclareQuestionClass{<singular name>}{<plural name>}`

Introduces a new dividing concept and defines both new options for the question environment and new global options.

For example you could decide you want to group your questions according to their difficulty. You could place the following line in your preamble:

```
1 \DeclareQuestionClass{difficulty}{difficulties}
```

This would define an option `use-difficulties` analogous to `use-classes` and `use-topics`. It would also define an option `difficulty` for the question environment. This means you could now do something like the following:

```
1 \SetupExSheets{use-difficulties={easy,hard}}
2 \begin{question}[difficulty=easy]
3   An easy question.
4 \end{question}
5 \begin{question}[difficulty=medium]
6   This one's a bit harder.
7 \end{question}
8 \begin{question}[difficulty=hard]
9   Now let's see if you can solve this one.
10 \end{question}
```

---

#### Exercise 24.

An easy question.

**Exercise 25.**

Now let's see if you can solve this one.

**12.4. Retrieving the Class Value in a Question**

Sometimes it may be desirable to retrieve the value of a class defined by `\DeclareQuestionClass` that a question has in order to be able to print, say. This is possible with the following commands:

\* `\GetQuestionClass{<class>}`

Prints the value of `<class>` a question has. The command is expandable. If the class does not exist or the value is empty the command expands to nothing.

`\PrintQuestionClassTF{<class>}{<true>}{<false>}`

Test if a question has a non-empty value for class `<class>` and either leaves `<true>` or `<false>` in the input stream. In the `<true>` argument you can refer to the value with `#1` where you want it printed.

`\PrintQuestionClassT{<class>}{<true>}`

Like `\PrintQuestionClassTF` but only has the `<true>` branch.

`\PrintQuestionClassF{<class>}{<false>}`

Like `\PrintQuestionClassTF` but only has the `<false>` branch.

```

1 \begin{question}[difficulty=hard]
2   This question has the difficulty level
3   ''\PrintQuestionClassTF{difficulty}{#1}{??}''
4 \end{question}

```

**Exercise 26.**

This question has the difficulty level “hard”.

**13. Adding and Using Additional Information to Questions**

For managing lots of questions and corresponding solutions it can be very useful to be able to save and recover additional information to the questions. This is possible with the following commands. First the ones for saving:

`\DeclareQuestionProperty{<name>}`

This command defines a question property `<name>`. It can only be used in the document preamble.

`\SetQuestionProperties{<name>=<value>, ...}`

Set the properties for a specific question. this command can only be used inside the question environment.

### 13. Adding and Using Additional Information to Questions

Now the commands for recovering the properties:

`\QuestionNumber{⟨id⟩}`

Recover the number of the question with the ID `⟨id⟩`. The number is displayed according to the format set with `counter-format`.

\* `\GetQuestionProperty{⟨name⟩}{⟨id⟩}`

Recover the property `⟨name⟩` of the question with the ID `⟨id⟩`. Of course the property must have been declared before. The command is expandable. Since the properties of a question are written to the aux file it is possible to retrieve them before the corresponding question environment has been used.

Introduced in  
version 0.12

Let's say we have declared the properties notes, reference and topic. By default the property points is available and gets the value of the optional argument of the question environment.

We can now do the following:

```
1 % uses 'biblatex'
2 \begin{question}[ID=center,topic=LaTeX]{3}
3   Explain how you could center text in a \LaTeX\ document.
4   \SetQuestionProperties{
5     topic      = \TeX/\LaTeX ,
6     notes      = {How to center text.},
7     reference   = {\textcite{companion}}
8 \end{question}
9 \begin{solution}
10   To center a short part of the text body one can use the \env*{center}
11   environment (\points{1}). Inside an environment like \env*{table} one
12   should use \cs*{centering} (\points{1}). For single lines there is also
13   the \cs*{centerline} command (\points{1}).
14 \end{solution}
15 \begin{question}[ID=knuthbooks,topic=LaTeX]{2}
16   Name two books by D.\,E.\,Knuth.
17   \SetQuestionProperties{
18     topic      = \TeX/\LaTeX ,
19     notes      = {Books by Knuth.},
20     reference   = {\textcite{knuth:ct:a,knuth:ct:b,knuth:ct:c,knuth:ct:d,knuth:
21   ct:e}}
22 \end{question}
23 \begin{solution}
24   For example two volumes from \citetitle{knuth:ct}:
25   \citetitle{knuth:ct:a,knuth:ct:b,knuth:ct:c,knuth:ct:d,knuth:ct:e}. Each
26   valid answer is worth \points{1}
27 \end{solution}
```

**Exercise 27.**

3 P.

Explain how you could center text in a  $\text{\LaTeX}$  document.

**Exercise 28.**

2 P.

Name two books by D. E. Knuth.

It is now possible to recover these values later:

```

1 % uses 'booktabs'
2 \begin{center}
3   \begin{tabular}{lll}
4     \toprule
5       Question & Property & \\
6     \midrule
7     \QuestionNumber{center}
8       & Points      & \GetQuestionProperty{points}{center} \\
9       & Topic        & \GetQuestionProperty{topic}{center} \\
10      & References   & \GetQuestionProperty{reference}{center} \\
11      & Note         & \GetQuestionProperty{notes}{center} \\
12    \midrule
13    \QuestionNumber{knuthbooks}
14      & Points      & \GetQuestionProperty{points}{knuthbooks} \\
15      & Topic        & \GetQuestionProperty{topic}{knuthbooks} \\
16      & References   & \GetQuestionProperty{reference}{knuthbooks} \\
17      & Note         & \GetQuestionProperty{notes}{knuthbooks} \\
18    \bottomrule
19  \end{tabular}
20 \end{center}

```

Question	Property	
27.	Points	3
	Topic	$\text{\TeX}/\text{\LaTeX}$
	References	GOOSSENS, MITTELBACH, and SAMARIN [GMS94]
	Note	How to center text.
28.	Points	2
	Topic	$\text{\TeX}/\text{\LaTeX}$
	References	KNUTH [Knu84b; Knu86a; Knu86b; Knu86c; Knu86d]
	Note	Books by Knuth.

Introduced in  
version 0.7a

If you use the package option `auto-label` the properties `ref` and `pageref` are predefined which will call the corresponding `\ref` or `\pageref`, respectively. Also see section 17.

## 14. Variations of an Exam

Please note that these properties *are not the same* as the dividing concepts explained in section 12 although they may seem similar in meaning or even have the same name.

There are additional commands that might prove useful:

Introduced in  
version 0.3

`\ForEachQuestion{⟨code to be executed for each used question⟩}`

Inside the argument one can refer to the ID of a question with #1. Beware that this command only knows of questions used before it is issued.

\* `\numberofquestions`

Returns the current number of used questions. Beware that this command only knows of questions used before it is issued.

\* `\iflastquestion{⟨true code⟩}{⟨false code⟩}`

Although this command is available in the whole document it is only useful inside `\ForEachQuestion`. It tells you if the end of the loop is reached or not.

For example one could use these commands to create a grading table:

```
1 \begin{tabular}{|l|*{\numberofquestions}{c|}c|}\hline
2   Question &
3   \ForEachQuestion{\QuestionNumber{#1}\iflastquestion{}{&}} &
4   Total \\ \hline
5   Points &
6   \ForEachQuestion{\GetQuestionProperty{points}{#1}\iflastquestion{}{&}} &
7   \pointssum* \\ \hline
8   Reached &
9   \ForEachQuestion{\iflastquestion{}{&}} & \\ \hline
10 \end{tabular}
```

For four questions the table now would look similar to figure 1.

Question	1.	2.	3.	4.	Total
Points	3	5	10	8	26
Reached					

FIGURE 1: An example for a grading table. (Actually this is a fake. See the grading-table.tex file shipped with exsheets for the real use case.)

## 14. Variations of an Exam

Introduced in  
version 0.6

It is a quite common task to design an exam in two different variants. This is of course possible with **ExSHEETS**' classes (see section 12.1). However, often not the whole question is to be different but only small details, the numbers in a maths exam, say. For this purpose **ExSHEETS** provides the following commands:

`\SetVariations{⟨num⟩}`

Set the number of different variants. This will determine how many arguments the command `\vary` will get. `⟨num⟩` must at least be 2 and is initially set to 2.

`\variant{⟨num⟩}`

Choose the active variant. The argument must be a number between 1 and the number set with `\SetVariations`. Initially set to 1.

`\vary{⟨variant 1⟩}{⟨variant 2⟩}`

This command is the one actually used in the document. It has a number of required arguments equal to the number set with `\SetVariations`. All of its arguments are discarded except the one specified with `\variant`.

`\lastvariant`

Each time `\vary` is called it stores the value it chose in `\lastversion`. This might be convenient to use if one otherwise would have to repeatedly write the same `\vary`.

Introduced in  
version 0.7b

```

1 \SetVariations{6}%
2 \variant{6}\vary{A}{B}{C}{D}{E}{F}
3 (last variant: \lastvariant)
4 \variant{1}\vary{A}{B}{C}{D}{E}{F}
5 (last variant: \lastvariant)
6 \variant{5}\vary{A}{B}{C}{D}{E}{F}
7 (last variant: \lastvariant)
8 \variant{2}\vary{A}{B}{C}{D}{E}{F}
9 (last variant: \lastvariant)
10 \variant{4}\vary{A}{B}{C}{D}{E}{F}
11 (last variant: \lastvariant)
12 \variant{3}\vary{A}{B}{C}{D}{E}{F}
13 (last variant: \lastvariant)

```

---

F (last variant: F) A (last variant: A) E (last variant: E) B (last variant: B) D (last variant: D) C (last variant: C)

## 15. A Grade Distribution

Probably this is a rather esoteric feature but it could proof useful in some cases. Suppose you are a German math teacher and want to grade exactly corresponding to the number of points relative to the sum of total points, regardless of how big that might be. You could do something like this to present your grading decisions for the exam:

```

1 % preamble:
2 % \DeclareRelGrades{

```

```

3 % 1 = 1 ,
4 % {1,5} = .9167 ,
5 % 2 = .8333 ,
6 % {2,5} = .75 ,
7 % 3 = .6667 ,
8 % {3,5} = .5833 ,
9 % 4 = .5
10 % }
11 \small\setlength\tabcolsep{2pt}
12 \begin{tabular}{r|*8c}
13 Punkte
14 & $\grade*{1}$ & & & & & & & $\le\grade*{1}$ & & & & & & & & $\le\grade*{1,5}$ & & & & & & & & $\le\grade*{2}$
15 & $\le\grade*{2,5}$ & & & & & & & $\le\grade*{3}$ & & & & & & & & $\le\grade*{3,5}$ & & & & & & & & $\le\grade*{4}$ \\
16 Note
17 & 1 & 1-2 & 2 & 2-3 & 3 & 3-4 & 4 & 5
18 \end{tabular}

```

---

Punkte	64.75	≤	64.75	≤	59	≤	54	≤	49	≤	43	≤	38	<	32
Note	1		1-2		2		2-3		3		3-4		4		5

These are the available commands and options:

`\DeclareRelGrades{⟨grade⟩=⟨num⟩, ...}`

This command is used to define grades and assign the percentage of total points to them.

`\grade*{⟨grade⟩}`

Gives the number of points corresponding to a grade depending on the value of `\pointssum` with or without (starred version) “unit”.

`grades » round = {⟨num⟩}`

Default: 0

The number of decimals the points of a grade are rounded to. This doesn’t apply to the maximum number of points if the rounded number would be bigger than the actual sum.

`grades » half = true|false`

Default: false

If set to true points are rounded either to full or to half points.

## 16. Selectively Include Questions from External Files

### 16.1. Caveat

I need to say some words of caution: the `\includequestions` that will be presented shortly is probably **ExSHEETS**’ most experimental one at the time of writing (May 11, 2014). Thanks to feedback of users it is constantly improved and bugs are fixed. It is not a very efficient way to insert question regarding performance and you shouldn’t wonder if compilation slows down when you use it. It probably needs to be re-written all over but on the one hand that would introduce new bugs and on the other hand for the time being I don’t have the capacities, anyway, so you’ll have to live it, I’m afraid.

**16.2. How it works**

Suppose you have one or more files with questions prepared to use them as a kind of database. One for class A, say, one for class B, one for class C and so one, something like this:

```

1 % this is file classA.tex
2 \begin{question}[class=A,ID=A1,topic=X]
3   First question of class A, topic X.
4 \end{question}
5 \begin{solution}
6   First solution of class A.
7 \end{solution}
8 \begin{question}[class=A,ID=A2,topic=Y]
9   Second question of class A, topic Y.
10 \end{question}
11 \begin{solution}
12   Second solution of class A.
13 \end{solution}
14 ...
15 % end of file classA.tex
16 \endinput

```

You can of course just `\input` or `\include` it but that would of course include the whole file into your document. But wouldn't it be nice to just include selected questions? Or maybe a five random questions from the file? That is possible with the following command:

`\includequestions[⟨options⟩]{⟨list of filenames⟩}`

Include questions from external files.

If you use it without options it will have the same effect as `\input`. There are however the following options:

`include » all = true | false`

`include » IDs = {⟨list of IDs⟩}` (initially empty)  
Includes only the specified questions.

`include » random = {⟨num⟩}` (initially empty)  
Includes `⟨num⟩` randomly selected questions. This option uses the `pgfcore` package to create the pseudo-random numbers.

`include » exclude = {⟨list of IDs⟩}` (initially empty)  
Questions who's IDs are specified here are *not* included. This option can be combined with the `random` option.

The usage should be self-explainable:



```

1 % include questions A1, A3 and A4:
2 \includequestions[IDs={A1,A3,A4}]{classA.tex}
3 % or include 3 random questions:
4 \includequestions[random=3]{classA}

```

In order to be able to select the questions `EXSHEETS` needs to `\input` the file twice. The first time the available questions are determined, the second time the selected questions are used. This unfortunately means that anything that is *not* part of a question or solution is also input twice. Either don't put anything else into the file or use one of the following commands for control:

`\PrintIfIncludeActiveTF{<true code>}{<false code>}`

Checks if the questions are actively included or not and puts *<true code>* or *<false code>* in the input stream depending on the answer.

`\PrintIfIncludeActiveT{<true code>}`

Checks if the questions are actively included or not and puts *<true code>* in the input stream if the answer is yes.

`\PrintIfIncludeActiveF{<false code>}`

Checks if the questions are actively included or not and puts *<false code>* in the input stream if the answer is no.

The selection can be refined further by selecting questions belonging to a specific class of questions (see section 12) before using `\includequestions`.

After you've used `\includequestions` the IDs of the included questions is available as an unordered comma separated list in the following macro:

`\questionsincludedlast`

Unordered comma separated list of question IDs included with the last usage of `\includequestions`.

## 17. The *auto-label* Option

The package option `auto-label` sets a `\label{qu:<id>}` every time the question environment is used. Both the used command and the automated label can be customized using the following options:

`label-format = {<code>}`

Default: `qu:#1`

The pattern for generating the automatic label. #1 gets replaced by the ID of the corresponding question.

`label-cmd = {<macro>}`

Default: `\label`

The command used for generating the label. A command that should take one mandatory argument.

Introduced in  
version 0.8

Introduced in  
version 0.12

`ref-cmd = {\macro}`

Default: `\ref`

The command used in the `ref` property created by the `auto-label` option, also see section 13. The command should take one mandatory argument.

`pageref-cmd = {\macro}`

Default: `\pageref`

The command used in the `pageref` property created by the `auto-label` option, also see section 13. The command should take one mandatory argument.

## 18. Own Question/Solution Pairs

Changed in  
version 0.9

**EXSHEETS** provides the possibility to create new environments that behave like the question and solution environments. This would allow, for example, to define a `question*/solution*` environment pair for bonus questions. The following commands may be used in the document preamble:

`\NewQuSolPair{\question}[\question options][\general options]{\solution}[\solution options][\general options]`

Define a new pair of question and solution environments.

`\RenewQuSolPair{\question}[\question options][\general options]{\solution}[\solution options][\general options]`

Redefine an existing pair of question and solution environments.

The standard environments are defined as follows:

```
1 \NewQuSolPair{question}{solution}
```

Let's say we want the possibility to add bonus questions. A simple way would be to define starred variants that add a star in the margin left to the title:

```
1 % preamble:
2 % - \texorpdfstring is provided by 'hyperref'
3 % - \bigstar is provided by 'amssymb'
4 % \DeclareRobustCommand*\questionstar{\texorpdfstring{\bonusquestionsign}{* }}
5 % \DeclareRobustCommand*\bonusquestionsign{\llap{$\bigstar$\space}}
6 %
7 % \NewQuSolPair
8 %   {question*}[name=\questionstar Bonus Question]
9 %   {solution*}[name=\questionstar Solution]
10 \begin{question*}
11   This is a bonus question.
12 \end{question*}
13 \begin{solution*}[print]
14   This is what the solution looks like.
15 \end{solution*}
```

★ **Bonus Question 29.**

This is a bonus question.

★ **Solution 29.**

This is what the solution looks like.

As you can see the environments take the same options as are described for the standard question and solution environments.

## 19. Filling in the Blanks

### 19.1. Cloze

Changed in  
version 0.4

Both in exercise sheets and in exams it is sometimes desirable to be able to create \_\_\_\_\_ that have to be filled in. Or maybe some more lines: \_\_\_\_\_

---



---



---



---



---

`\blank*[\langle options \rangle]{\langle text to be filled in \rangle}`

creates a blank in normal text or in a question but fills the text of its argument if inside a solution. If used at the *begin of a paragraph* `\blank` will do two things: it will set the linespread according to an option explained below and will insert `\par` after the lines. If you don't want that use the starred version.

The options are these:

`blank » style = line|wave|dline|dotted|dashed` Default: line

The style of the line. This uses the corresponding command from the `ulem` package and is the whole reason why `ExSHEETS` loads it in the first place.

`blank » scale = {\langle num \rangle}` Default: 1

Scales the width of the blank by factor  $\langle num \rangle$  unless the width is explicitly set.

`blank » width = {\langle dim \rangle}` (initially empty)

The width of the line. If it is not used the width of the filled in text is used.

`blank » linespread = {\langle num \rangle}` Default: 1

Set the linespread for the blank lines. This only has an effect if `\blank` is used at the begin of a paragraph.

```

1 \begin{question}
2   Try to fill in \blank[width=4cm]{these} blanks. All of them
3   \blank[style=dotted]{are created} by using the \cs{blank}
4   \blank[style=dashed]{command}.
5 \end{question}
6 \begin{solution}[print]
7   Try to fill in \blank[width=4cm]{these} blanks. All of them
8   \blank[style=dotted]{are created} by using the \cs{blank}
9   \blank[style=dashed]{command}.
10 \end{solution}

```

**Exercise 30.**

Try to fill in \_\_\_\_\_ blanks. All of them ..... by using the \blank  
-----.

**Solution 30.**

Try to fill in these blanks. All of them are created by using the \blank command.

A number of empty lines are easily created by setting the width option:

```
1 \blank[width=4.8\linewidth, linespread=1.5]{}

```

**19.2. Vertical Space for answers**

Introduced in  
version 0.3

When you're creating an exam you might want to add some vertical space where the students can write down their answers. While you can always use \vspace this is not always handy when the space left on the page is less than you want. In this case it would be nice if a) there would be no warning and b) the rest of the space would be added at the top of the next page. This is what the following command is for:

`\examspace*{⟨dim⟩}`

Add space as specified in ⟨dim⟩. If the space available on the current page is not enough the rest of the space will be added at the top of the next page. The starred version will silently drop any leftover space instead of adding it to the next page.

**Exercise 31.**

What do you think of this feature?

```

1 \begin{question}
2   What do you think of this feature?
3   \examspace{3cm}
4 \end{question}
5 This line comes after the space.

```

This line comes after the space.

**20. Styling your Exercise/Exam Sheets****20.1. Background**

The **EXSHEETS** package makes extensive use of L<sup>A</sup>T<sub>E</sub>X<sub>3</sub>'s coffins<sup>16</sup> as well as its templates concept.<sup>17</sup> The latter allows a rather easy extension and customization of some of **EXSHEETS**' environments. To be more precise: you can define your own instances for the headings used for questions and solutions and for the tasks environment.

What this package doesn't provide is changing the background of questions or framing them. But this is easily possible using the `mdframed` package and its `\surroundwithmdframed` command.

**20.2. The `exsheets-headings` Object**

**EXSHEETS** defines the object `exsheets-headings` and one template for it, the 'default' template. The package also defines two instances of this template, the 'block' instance and the 'runin' instance.

```

1 \SetupExSheets{headings=block}
2 \begin{question}{1}
3   a 'block' heading
4 \end{question}
5 \SetupExSheets{headings=runin}
6 \begin{question}{1}
7   a 'runin' heading
8 \end{question}

```

---

16. See the documentation to the `xcoffins` package for more information on that.

17. Have a look into the documentation to the `xtemplate` package.

**Exercise 32.**

a ‘block’ heading

1 P.

**Exercise 33.** a ‘runin’ heading

1 P.

**20.2.1. Available Options**

This section only lists the options that can be used when defining an instance of the ‘default’ template. The following subsections will give loads of examples of their usage. The options are listed in the definition for the template interface:

```

1 \DeclareTemplateInterface{exsheets-heading}{default}{3}{
2   % option           : type       = default
3   inline             : boolean    = false ,
4   runin               : boolean    = false ,
5   indent-first       : boolean    = false ,
6   toc-reversed       : boolean    = false ,
7   vscale              : real       = 1    ,
8   above               : length     = 2pt  ,
9   below               : length     = 2pt  ,
10  main                 : tokenlist =      ,
11  pre-code             : tokenlist =      ,
12  post-code            : tokenlist =      ,
13  title-format         : tokenlist =      ,
14  title-pre-code       : tokenlist =      ,
15  title-post-code      : tokenlist =      ,
16  number-format        : tokenlist =      ,
17  number-pre-code      : tokenlist =      ,
18  number-post-code     : tokenlist =      ,
19  subtitle-format      : tokenlist =      ,
20  subtitle-pre-code    : tokenlist =      ,
21  subtitle-post-code   : tokenlist =      ,
22  points-format        : tokenlist =      ,
23  points-pre-code      : tokenlist =      ,
24  points-post-code     : tokenlist =      ,
25  join                 : tokenlist =      ,
26  attach               : tokenlist =      ,
27 }
```

Each heading is built with at most five coffins available with the names ‘main’, ‘title’, ‘subtitle’, ‘number’ and ‘points’. Those coffins place possibly the whole heading, the title, the subtitle, the question number and the assigned points. The only coffin that’s always typeset is the ‘main’ coffin, which is empty per default.

Coffins can be joined (two become one, the first extends its bounding box to contain the second) using the following syntax:

```
1 join = coffin1[handle11,handle12]coffin2[handle21,handle22](x-offset,y-offset)
```

The syntax for attaching (two become one, the first does *not* extend its bounding box around the second) is the same.

More on coffin handles is described in the documentation for the xcoffins. Figure 2 briefly demonstrates the available handle pairs.

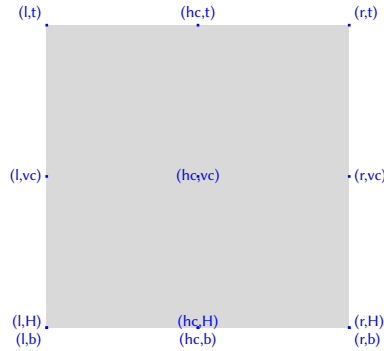


FIGURE 2: Available handles for a horizontal coffin.

The following subsections will show all definitions of the instances available with the package option `load-headings` and how they look. This will hopefully give you enough ideas to create your own instance if you want to have another heading style than the ones available.

Of you use the option `load-headings` each of the following instances is available through the option `headings = {\langle instance \rangle}`.

The following examples use a sample text defined as follows:

```
1 \def\s{This is some sample text we will use to create a somewhat
2 longer text spanning a few lines.}
3 \def\sample{\s\ \s\par\s}
```

All of the following examples use the same question call:

```
1 \SetupExSheets{headings=<name>}
2 \begin{question}[subtitle=The subtitle of the question]{1}
3 A '<name>' heading. \sample
4 \end{question}
```

### 20.2.2. The 'block' Instance

```
1 \DeclareInstance{exsheets-heading}{block}{default}{
2 join          = { title[r,B]number[l,B](.333em,0pt) } ,
3 attach        =
```

```
4      {  
5          main[l,vc]title[l,vc](0pt,0pt) ;  
6          main[r,vc]points[l,vc](\marginparsep,0pt)  
7      }  
8  }
```

**Exercise 34.**

1 P.

A 'block' heading. This is some sample text we will use to create a somewhat longer text spanning a few lines. This is some sample text we will use to create a somewhat longer text spanning a few lines.

This is some sample text we will use to create a somewhat longer text spanning a few lines.



**20.2.3. The ‘runin’ Instance**

```

1 \DeclareInstance{exsheets-heading}{runin}{default}{
2   runin          = true ,
3   number-post-code = \space ,
4   attach         =
5   { main[l,vc]points[l,vc](\linewidth+\marginparsep,0pt) } ,
6   join          =
7   {
8     main[r,vc]title[r,vc](0pt,0pt) ;
9     main[r,vc]number[l,vc](.333em,0pt)
10  }
11 }

```

**Exercise 35.** A ‘runin’ heading. This is some sample text we will use to create a somewhat longer text spanning a few lines. This is some sample text we will use to create a somewhat longer text spanning a few lines. 1 P.

This is some sample text we will use to create a somewhat longer text spanning a few lines.

**20.2.4. The ‘simple’ Instance**

```

1 \DeclareInstance{exsheets-heading}{simple}{default}{
2   title-format    = \normalsize ,
3   points-pre-code = ( ,
4   points-post-code = ) ,
5   attach          = { main[l,t]number[l,t](0pt,0pt) } ,
6   join           =
7   {
8     number[r,b]title[l,b](.333em,0pt) ;
9     main[l,b]points[l,t](1em,0pt)
10  }
11 }

```

**36. Exercise**

(1 P.)

A ‘simple’ heading. This is some sample text we will use to create a somewhat longer text spanning a few lines. This is some sample text we will use to create a somewhat longer text spanning a few lines.

This is some sample text we will use to create a somewhat longer text spanning a few lines.

**20.2.5. The ‘empty’ Instance**Introduced in  
version 0.9a

```

1 \DeclareInstance{exsheets-heading}{empty}{default}{
2   runin = true ,
3   above = \parskip ,
4   below = \parskip ,
5   attach = { main[l,vc]points[l,vc](\linewidth+\marginparsep,0pt) }
6 }

```

An ‘empty’ heading. This is some sample text we will use to create a somewhat longer text spanning a few lines. This is some sample text we will use to create a somewhat longer text spanning a few lines. 1 P.

This is some sample text we will use to create a somewhat longer text spanning a few lines.

**20.2.6. The ‘block-rev’ Instance**

```

1 \DeclareInstance{exsheets-heading}{block-rev}{default}{
2   toc-reversed = true ,
3   join = { number[r,B]title[l,B](.333em,0pt) } ,
4   attach =
5     {
6       main[l,vc]number[l,vc](0pt,0pt) ;
7       main[r,vc]points[l,vc](\marginparsep,0pt)
8     }
9 }

```

**38. Exercise**

1 P.

A ‘block-rev’ heading. This is some sample text we will use to create a somewhat longer text spanning a few lines. This is some sample text we will use to create a somewhat longer text spanning a few lines.

This is some sample text we will use to create a somewhat longer text spanning a few lines.

**20.2.7. The ‘block-subtitle’ Instance**Introduced in  
version 0.10

```

1 \DeclareInstance{exsheets-heading}{block-subtitle}{default}{
2   join = {
3     title[r,B]number[l,B](.333em,0pt) ;
4     title[r,B]subtitle[l,B](1em,0pt)
5   } ,
6   attach = {
7     main[l,vc]title[l,vc](0pt,0pt) ;
8     main[r,vc]points[l,vc](\marginparsep,0pt)
9   }

```

```
10 }
```

**Exercise 39.** *The subtitle of the question*

1 P.

A ‘block-subtitle’ heading. This is some sample text we will use to create a somewhat longer text spanning a few lines. This is some sample text we will use to create a somewhat longer text spanning a few lines.

This is some sample text we will use to create a somewhat longer text spanning a few lines.

**20.2.8. The ‘block-wp’ Instance**

```
1 \DeclareInstance{exsheets-heading}{block-wp}{default}{
2   points-pre-code = ( ,
3   points-post-code = ) ,
4   join           =
5   {
6     title[r,B]number[l,B](.333em,0pt) ;
7     title[r,B]points[l,B](.333em,0pt)
8   } ,
9   attach         = { main[l,vc]title[l,vc](0pt,0pt) }
10 }
```

**Exercise 40.** (1 P.)

A ‘block-wp’ heading. This is some sample text we will use to create a somewhat longer text spanning a few lines. This is some sample text we will use to create a somewhat longer text spanning a few lines.

This is some sample text we will use to create a somewhat longer text spanning a few lines.

**20.2.9. The ‘block-wp-rev’ Instance**

```
1 \DeclareInstance{exsheets-heading}{block-wp-rev}{default}{
2   toc-reversed    = true ,
3   points-pre-code = ( ,
4   points-post-code = ) ,
5   join           =
6   {
7     number[r,B]title[l,B](.333em,0pt) ;
8     number[r,B]points[l,B](.333em,0pt)
9   } ,
10  attach         = { main[l,vc]number[l,vc](0pt,0pt) }
11 }
```

**41. Exercise (1 P.)**

A 'block-wp-rev' heading. This is some sample text we will use to create a somewhat longer text spanning a few lines. This is some sample text we will use to create a somewhat longer text spanning a few lines.

This is some sample text we will use to create a somewhat longer text spanning a few lines.

**20.2.10. The 'block-nr' Instance**

```

1 \DeclareInstance{exsheets-heading}{block-nr}{default}{
2   attach          =
3   {
4     main[l,vc]number[l,vc](0pt,0pt) ;
5     main[r,vc]points[l,vc](\marginparsep,0pt)
6   }
7 }
```

**42.**

1 P.

A 'block-nr' heading. This is some sample text we will use to create a somewhat longer text spanning a few lines. This is some sample text we will use to create a somewhat longer text spanning a few lines.

This is some sample text we will use to create a somewhat longer text spanning a few lines.

**20.2.11. The 'block-nr-wp' Instance**

```

1 \DeclareInstance{exsheets-heading}{block-nr-wp}{default}{
2   points-pre-code = ( ,
3   points-post-code = ) ,
4   join            = { number[r,vc]points[l,vc](.333em,0pt) } ,
5   attach          = { main[l,vc]number[l,vc](0pt,0pt) }
6 }
```

**43. (1 P.)**

A 'block-nr-wp' heading. This is some sample text we will use to create a somewhat longer text spanning a few lines. This is some sample text we will use to create a somewhat longer text spanning a few lines.

This is some sample text we will use to create a somewhat longer text spanning a few lines.

**20.2.12. The 'runin-rev' Instance**

```

1 \DeclareInstance{exsheets-heading}{runin-rev}{default}{
2   toc-reversed    = true ,
3   runin           = true ,
```

```

4 title-post-code = \space ,
5 attach         =
6 { main[l,vc]points[l,vc](\linewidth+\marginparsep,0pt) } ,
7 join           =
8 {
9     main[r,vc]number[r,vc](0pt,0pt) ;
10    main[r,vc]title[l,vc](.333em,0pt)
11 }
12 }

```

**44. Exercise** A ‘runin-rev’ heading. This is some sample text we will use to create a somewhat longer text spanning a few lines. This is some sample text we will use to create a somewhat longer text spanning a few lines. 1 P.

This is some sample text we will use to create a somewhat longer text spanning a few lines.

### 20.2.13. The ‘runin-wp’ Instance

```

1 \DeclareInstance{exsheets-heading}{runin-wp}{default}{
2   runin           = true ,
3   points-pre-code = ( ,
4   points-post-code = )\space ,
5   join            =
6   {
7       main[r,vc]title[r,vc](0pt,0pt) ;
8       main[r,vc]number[l,vc](.333em,0pt) ;
9       main[r,vc]points[l,vc](.333em,0pt)
10  }
11 }

```

**Exercise 45.** (1 P.) A ‘runin-wp’ heading. This is some sample text we will use to create a somewhat longer text spanning a few lines. This is some sample text we will use to create a somewhat longer text spanning a few lines.

This is some sample text we will use to create a somewhat longer text spanning a few lines.

### 20.2.14. The ‘runin-wp-rev’ Instance

```

1 \DeclareInstance{exsheets-heading}{runin-wp-rev}{default}{
2   toc-reversed    = true ,
3   runin           = true ,
4   points-pre-code = ( ,
5   points-post-code = )\space ,
6   join            =
7   {
8       main[r,vc]number[r,vc](0pt,0pt) ;

```

```

9      main[r,vc]title[l,vc](.333em,0pt) ;
10     main[r,vc]points[l,vc](.333em,0pt)
11   }
12 }

```

**46. Exercise** (1 P.) A ‘runin-wp-rev’ heading. This is some sample text we will use to create a somewhat longer text spanning a few lines. This is some sample text we will use to create a somewhat longer text spanning a few lines.

This is some sample text we will use to create a somewhat longer text spanning a few lines.

#### 20.2.15. The ‘runin-nr’ Instance

```

1 \DeclareInstance{exsheets-heading}{runin-nr}{default}{
2   runin          = true ,
3   number-post-code = \space ,
4   attach         =
5     { main[l,vc]points[l,vc](\linewidth+\marginparsep,0pt) } ,
6   join           = { main[r,vc]number[l,vc](0pt,0pt) }
7 }

```

**47.** A ‘runin-nr’ heading. This is some sample text we will use to create a somewhat longer text spanning a few lines. This is some sample text we will use to create a somewhat longer text spanning a few lines. 1 P.

This is some sample text we will use to create a somewhat longer text spanning a few lines.

#### 20.2.16. The ‘runin-fixed-nr’ Instance

```

1 \DeclareInstance{exsheets-heading}{runin-fixed-nr}{default}{
2   runin          = true ,
3   number-pre-code = \hbox to 2em \bgroup ,
4   number-post-code = \hfil\egroup ,
5   attach         =
6     { main[l,vc]points[l,vc](\linewidth+\marginparsep,0pt) } ,
7   join           = { main[r,vc]number[l,vc](0pt,0pt) }
8 }

```

**48.** A ‘runin-fixed-nr’ heading. This is some sample text we will use to create a somewhat longer text spanning a few lines. This is some sample text we will use to create a somewhat longer text spanning a few lines. 1 P.

This is some sample text we will use to create a somewhat longer text spanning a few lines.

**20.2.17. The ‘runin-nr-wp’ Instance**

```

1 \DeclareInstance{exsheets-heading}{runin-nr-wp}{default}{
2   runin           = true ,
3   points-pre-code = ( ,
4   points-post-code = )\space ,
5   join           =
6   {
7     main[r,vc]number[l,vc](0pt,0pt) ;
8     main[r,vc]points[l,vc](.333em,0pt)
9   }
10 }

```

**49.** (1 P.) A ‘runin-nr-wp’ heading. This is some sample text we will use to create a somewhat longer text spanning a few lines. This is some sample text we will use to create a somewhat longer text spanning a few lines.

This is some sample text we will use to create a somewhat longer text spanning a few lines.

**20.2.18. The ‘inline’ Instance**

Introduced in  
version 0.5

```

1 \DeclareInstance{exsheets-heading}{inline}{default}{
2   inline           = true ,
3   number-pre-code  = \space ,
4   number-post-code = \space ,
5   join           =
6   {
7     main[r,vc]title[r,vc](0pt,0pt) ;
8     main[r,vc]number[l,vc](0pt,0pt)
9   }
10 }

```

Text before **Exercise 50.** An ‘inline’ heading. This is some sample text we will use to create a somewhat longer text spanning a few lines. This is some sample text we will use to create a somewhat longer text spanning a few lines.

This is some sample text we will use to create a somewhat longer text spanning a few lines.  
Text after

**20.2.19. The ‘inline-wp’ Instance**

Introduced in  
version 0.5

```

1 \DeclareInstance{exsheets-heading}{inline-wp}{default}{
2   inline           = true ,
3   number-pre-code  = \space ,
4   number-post-code = \space ,

```

```

5  points-pre-code = ( ,
6  points-post-code = )\space ,
7  join           =
8  {
9      main[r,vc]title[r,vc](0pt,0pt) ;
10     main[r,vc]number[l,vc](0pt,0pt) ;
11     main[r,vc]points[l,vc](0pt,0pt)
12 }
13 }

```

Text before **Exercise 51.** (1 P.) An ‘inline-wp’ heading. This is some sample text we will use to create a somewhat longer text spanning a few lines. This is some sample text we will use to create a somewhat longer text spanning a few lines.

This is some sample text we will use to create a somewhat longer text spanning a few lines.  
Text after

#### 20.2.20. The ‘inline-nr’ Instance

Introduced in  
version 0.5

```

1  \DeclareInstance{exsheets-heading}{inline-nr}{default}{
2  inline           = true ,
3  number-post-code = \space ,
4  join            = { main[r,vc]number[l,vc](0pt,0pt) }
5  }

```

Text before **52.** An ‘inline-nr’ heading. This is some sample text we will use to create a somewhat longer text spanning a few lines. This is some sample text we will use to create a somewhat longer text spanning a few lines.

This is some sample text we will use to create a somewhat longer text spanning a few lines.  
Text after

#### 20.2.21. The ‘centered’ Instance

```

1  \DeclareInstance{exsheets-heading}{centered}{default}{
2  join            = { title[r,B]number[l,B](.333em,0pt) } ,
3  attach         =
4  {
5      main[hc,vc]title[hc,vc](0pt,0pt) ;
6      main[r,vc]points[l,vc](\marginparsep,0pt)
7  }
8  }

```



**Exercise 53.**

1 P.

A ‘centered’ heading. This is some sample text we will use to create a somewhat longer text spanning a few lines. This is some sample text we will use to create a somewhat longer text spanning a few lines.

This is some sample text we will use to create a somewhat longer text spanning a few lines.

**20.2.22. The ‘centered-wp’ Instance**

```

1 \DeclareInstance{exsheets-heading}{centered-wp}{default}{
2   points-pre-code = ( ,
3   points-post-code = ) ,
4   join            =
5   {
6     title[r,B]number[l,B](.333em,0pt) ;
7     title[r,B]points[l,B](.333em,0pt)
8   } ,
9   attach          = { main[hc,vc]title[hc,vc](0pt,0pt) }
10 }
```

**Exercise 54. (1 P.)**

A ‘centered-wp’ heading. This is some sample text we will use to create a somewhat longer text spanning a few lines. This is some sample text we will use to create a somewhat longer text spanning a few lines.

This is some sample text we will use to create a somewhat longer text spanning a few lines.

**20.2.23. The ‘margin’ Instance**

```

1 \DeclareInstance{exsheets-heading}{margin}{default}{
2   runin          = true ,
3   number-post-code = \space ,
4   points-pre-code = ( ,
5   points-post-code = )\space ,
6   join           = { title[r,b]number[l,b](.333em,0pt) } ,
7   attach         =
8   {
9     main[l,vc]title[r,vc](0pt,0pt) ;
10    main[l,b]points[r,t](0pt,0pt)
11  }
12 }
```

**Exercise 55.** A ‘margin’ heading. This is some sample text we will use to create a somewhat longer text (1 P.) spanning a few lines. This is some sample text we will use to create a somewhat longer text spanning a few lines.

This is some sample text we will use to create a somewhat longer text spanning a few lines.

**20.2.24. The ‘margin-nr’ Instance**

```

1 \DeclareInstance{exsheets-heading}{margin-nr}{default}{
2   runin = true ,
3   attach =
4   {
5     main[l,vc]number[r,vc](-.333em,0pt) ;
6     main[r,vc]points[l,vc](\linewidth+\marginparsep,0pt)
7   }
8 }

```

56. A ‘margin-nr’ heading. This is some sample text we will use to create a somewhat longer text spanning a few lines. This is some sample text we will use to create a somewhat longer text spanning a few lines. 1 P.

This is some sample text we will use to create a somewhat longer text spanning a few lines.

**20.2.25. The ‘raggedleft’ Instance**

```

1 \DeclareInstance{exsheets-heading}{raggedleft}{default}{
2   join = { title[r,B]number[l,B](.333em,0pt) } ,
3   attach =
4   {
5     main[r,vc]title[r,vc](0pt,0pt) ;
6     main[r,vc]points[l,vc](\marginparsep,0pt)
7   }
8 }

```

**Exercise 57. 1 P.**

A ‘raggedleft’ heading. This is some sample text we will use to create a somewhat longer text spanning a few lines. This is some sample text we will use to create a somewhat longer text spanning a few lines.

This is some sample text we will use to create a somewhat longer text spanning a few lines.

**20.2.26. The ‘fancy’ Instance**

```

1 \DeclareInstance{exsheets-heading}{fancy}{default}{
2   toc-reversed = true ,
3   indent-first = true ,
4   vscale = 2 ,
5   pre-code = \rule{\linewidth}{1pt} ,
6   post-code = \rule{\linewidth}{1pt} ,
7   title-format = \large\scshape\color{exsheetsred} ,
8   number-format = \large\bfseries\color{exsheetsblue} ,

```

```

9  points-format      = \itshape ,
10 join              = { number[r,B]title[l,B](.333em,0pt) } ,
11 attach            =
12   {
13     main[hc,vc]number[hc,vc](0pt,0pt) ;
14     main[l,vc]points[r,vc](-\marginparsep,0pt)
15   }
16 }

```

1 P.

**58. Exercise**

A ‘fancy’ heading. This is some sample text we will use to create a somewhat longer text spanning a few lines. This is some sample text we will use to create a somewhat longer text spanning a few lines.

This is some sample text we will use to create a somewhat longer text spanning a few lines.

**20.2.27. The ‘fancy-wp’ Instance**

```

1  \DeclareInstance{exsheets-heading}{fancy-wp}{default}{
2    toc-reversed      = true ,
3    indent-first      = true ,
4    vscale            = 2 ,
5    pre-code          = \rule{\linewidth}{1pt} ,
6    post-code         = \rule{\linewidth}{1pt} ,
7    title-format      = \large\scshape\color{exsheetsred} ,
8    number-format     = \large\bfseries\color{exsheetsblue} ,
9    points-format     = \itshape ,
10   points-pre-code   = ( ,
11   points-post-code  = ) ,
12   join              =
13   {
14     number[r,B]title[l,B](.333em,0pt) ;
15     number[r,B]points[l,B](.333em,0pt)
16   } ,
17   attach            = { main[hc,vc]number[hc,vc](0pt,0pt) }
18 }

```

**59. Exercise (1 P.)**

A ‘fancy-wp’ heading. This is some sample text we will use to create a somewhat longer text spanning a few lines. This is some sample text we will use to create a somewhat longer text spanning a few lines.

This is some sample text we will use to create a somewhat longer text spanning a few lines.

### 20.3. Load Custom Configurations

If you have custom configurations you want to be loaded automatically then save them in a file `exsheets-configurations.cfg`. If this file is present it will be loaded `\AtBeginDocument`.

## Part III.

# The **EXSHEETS-LISTINGS** Package v0.2

### 21. The Problem

I knew the day would come when people would ask how to include verbatim material in the question and solution environments. Since they're defined with the `environ` package they're reading their environment bodies like macros read their arguments. This makes it impossible to use verbatim material inside them.<sup>18</sup> Now the day has come [Bra13]. Soon after the first question appeared I wrote the first draft for **EXSHEETS-LISTINGS** for a question on `TEX.sx` [Ass13].

### 22. The Proposed Solution

The **EXSHEETS-LISTINGS** package defines listings environments that place their contents inside question and solution environments. They do this by writing the listing to a unique auxiliary file – questions to `\jobname-ex<num>.lst` and solutions to `\jobname-sol<num>.lst` where `<num>` is an increasing integer that ensures that each listing gets a unique file name. Those files are then included with `\lstinutlisting` if and when the question or solution is printed.

`\begin{lstquestion}[<options>]`

A listings environment placed in a question.

`\begin{lstsolution}[<options>]`

A listings environment placed in a solution.

All you have to do to use the package is loading it the usual way:

```
1 \usepackage{exsheets-listings}
```

This will also load the packages **EXSHEETS** and **listings** if they're not loaded already.

```
1 % this uses my listings style used in this documentation for all pieces of
2 % code:
3 \begin{lstquestion}[%
```

---

<sup>18</sup> See the `TEX` FAQ <http://www.tex.ac.uk/cgi-bin/texfaq2html?label=verbwithin> for reasons why.

```

4   pre=Explain what this piece of \LaTeX\ code does:,
5   listings={style=cnltx}}
6   \begingroup\expandafter\expandafter\expandafter\endgroup
7   \expandafter\ifx\csname foo\endcsname\relax
8   ...
9   \else
10  ...
11  \fi
12 \end{lstquestion}

```

---

**Exercise 60.**

Explain what this piece of L<sup>A</sup>T<sub>E</sub>X code does:

```

1 \begingroup\expandafter\expandafter\expandafter\endgroup
2 \expandafter\ifx\csname foo\endcsname\relax
3 ...
4 \else
5 ...
6 \fi

```

The example already shows two options of these environments. Here is the complete list:

**pre** = {*⟨text⟩*}

*⟨text⟩* is placed before the code in the question or solution environment.

**post** = {*⟨text⟩*}

*⟨text⟩* is placed after the code in the question or solution environment.

**options** = {*⟨options⟩*}

Options passed to underlying the question or solution environment.

**points** = {*⟨points⟩*}

The points assigned to the underlying question environment.

**listings** = {*⟨options⟩*}

Options passed to the underlying listings environment.

There are also two new options for **ExSHEETS** that can be set with **\SetupExSheets**:

**question** » **listings** = {*⟨options⟩*}

Options passed to the underlying listings environment of `lstquestion`.

**solution** » **listings** = {*⟨options⟩*}

Options passed to the underlying listings environment of `lstsolution`.

## 23. Own Environments

`\NewLstQuSolPair`[*options for both environments*][*lst question env*]{*question env*}[*options for lst question env*][*lst solution env*]{*solution env*}[*options for lst solution env*]

Defines two new listings environments that place the listing in a question environment *question env* or a solution environment *solution env*. Those underlying environments should be environments as defined by `\NewQuSolPair`. The different options allow to preset options for the newly defined environments.

The existing environments have been defined like this:

```
1 \NewLstQuSolPair{lstquestion}{question}{lstsolution}{solution}
```

# Part IV. Appendix

## A. A List of all Solutions used in this Manual

### Solution 9.

This is the solution to exercise 9!

### Solution 10.

See? This solution gets printed where you have put it in the code of your document.

### Fancy name 11.

See? This solution gets printed where you have put it and has a fancy name!

### Solution 18.

This will be one of a few solutions printed by the following call of `\printsolutions`.

### Solution 19.

The solution to the question with the nice ID.

### Solution 20.

Yet another solution.

### Solution 27.

To center a short part of the text body one can use the center environment (1 P.). Inside an environment like table one should use `\centering` (1 P.). For single lines there is also the `\centerline` command (1 P.).

## B. Bibliography

### Solution 28.

For example two volumes from *Computers & Typesetting*: *T<sub>E</sub>Xbook*; *T<sub>E</sub>X*; *METAFONTbook*; *METAFONT*; *Computer Modern Typefaces*. Each valid answer is worth 1 P.

### ★ Solution 29.

This is what the solution looks like.

### Solution 30.

Try to fill in these blanks. All of them are created by using the `\blank` command.

## B. Bibliography

- [Ale01] Jason ALEXANDER. examdesign. version 1.1, Mar. 26, 2001.  
URL: <http://mirror.ctan.org/macros/latex/contrib/examdesign/>.
- [Ars11] Donald ARSENEAU. ulem, Mar. 18, 2011.  
URL: <http://mirror.ctan.org/macros/latex/contrib/ulem/>.
- [Ass13] Forkrul ASSAIL.  
*How do I extract repeated functionality (EXSHEETS workaround) to make it reusable?*  
Sept. 18, 2013.  
URL: <http://tex.stackexchange.com/q/133907/5049> (visited on 09/22/2013).
- [Bez11] Javier BEZOS. enumitem. version 3.5.2, Sept. 28, 2011.  
URL: <http://mirror.ctan.org/macros/latex/contrib/enumitem/>.
- [Bra13] Stefano BRAGAGLIA.  
*Fixing lstlisting inside EXSHEETS question and solution environments.*  
Sept. 4, 2013.  
URL: <http://tex.stackexchange.com/q/131546/5049> (visited on 09/22/2013).
- [Dae13] Walter DAEMS. exsol. version 0.6, May 12, 2013.  
URL: <http://mirror.ctan.org/macros/latex/contrib/exsol/>.
- [GMS94] Michel GOOSSENS, Frank MITTELBACH, and Alexander SAMARIN.  
*The LaTeX Companion*. 1st ed. Reading, Mass.: Addison-Wesley, 1994. 528 pp.
- [Hir11] Philip HIRSCHHORN. exam. version 2.4, May 22, 2011.  
URL: <http://mirror.ctan.org/macros/latex/contrib/exam/>.
- [Ker07] Uwe KERN. xcolor. version 2.11, Jan. 21, 2007.  
URL: <http://mirror.ctan.org/macros/latex/contrib/xcolor/>.
- [Kle05] Dennis KLETZING. multienum. version n.n. May 19, 2005.  
URL: <http://mirror.ctan.org/macros/latex/contrib/multienum/>.
- [Knu84a] Donald E. KNUTH. *Computers & Typesetting*. 5 vols.  
Reading, Mass.: Addison-Wesley, 1984–1986.
- [Knu84b] Donald E. KNUTH. *Computers & Typesetting*. Vol. A: *The T<sub>E</sub>Xbook*.  
Reading, Mass.: Addison-Wesley, 1984.

## B. Bibliography

- [Knu86a] Donald E. KNUTH. *Computers & Typesetting*. Vol. B: *T<sub>E</sub>X: The Program*. Reading, Mass.: Addison-Wesley, 1986.
- [Knu86b] Donald E. KNUTH. *Computers & Typesetting*. Vol. C: *The METAFONTbook*. Reading, Mass.: Addison-Wesley, 1986.
- [Knu86c] Donald E. KNUTH. *Computers & Typesetting*. Vol. D: *METAFONT: The Program*. Reading, Mass.: Addison-Wesley, 1986.
- [Knu86d] Donald E. KNUTH. *Computers & Typesetting*. Vol. E: *Computer Modern Typefaces*. Reading, Mass.: Addison-Wesley, 1986.
- [Leh11] Philipp LEHMAN. etoolbox. version 2.1, Jan. 3, 2011.  
URL: <http://mirror.ctan.org/macros/latex/contrib/etoolbox/>.
- [MV13] Grazia MESSINEO and Salvatore VASSALLO. esami. version 1.0, Mar. 8, 2013.  
URL: <http://mirror.ctan.org/macros/latex/contrib/esami/>.
- [Nie13] Clemens NIEDERBERGER. translations. version 1.1, Aug. 5, 2013.  
URL: <http://mirror.ctan.org/macros/latex/contrib/translations/>.
- [Pic12] Paul PICHAUREAU. exercise. version 1.58, May 8, 2012.  
URL: <http://mirror.ctan.org/macros/latex/contrib/exercise/>.
- [Pif10] Mike PIFF, current maintainer: Joseph WRIGHT. answers. version 2.13, Oct. 11, 2010.  
URL: <http://mirror.ctan.org/macros/latex/contrib/answers/>.
- [Rob13] Will ROBERTSON. environ. version 0.3, Apr. 1, 2013.  
URL: <http://mirror.ctan.org/macros/latex/contrib/environ/>.
- [Sto11] D. P. STORY. eqexam. version 3.ok, Sept. 1, 2011.  
URL: <http://mirror.ctan.org/macros/latex/contrib/eqexam/>.
- [Tal12] Nicola L. C. TALBOT. probsoln. version 3.04, Aug. 23, 2012.  
URL: <http://mirror.ctan.org/macros/latex/contrib/probsoln/>.
- [Tan10] Till TANTAU. TikZ/pgf. version 2.10, Oct. 25, 2010.  
URL: <http://mirror.ctan.org/graphics/pgf/>.
- [Tea13a] The L<sup>A</sup>T<sub>E</sub>X<sub>3</sub> Project TEAM. l3experimental. version SVN 4582, July 28, 2013.  
URL: <http://mirror.ctan.org/macros/latex/contrib/l3experimental/>.
- [Tea13b] The L<sup>A</sup>T<sub>E</sub>X<sub>3</sub> Project TEAM. l3kernel. version SVN 4582, July 28, 2013.  
URL: <http://mirror.ctan.org/macros/latex/contrib/l3kernel/>.
- [Tea13c] The L<sup>A</sup>T<sub>E</sub>X<sub>3</sub> Project TEAM. l3packages. version SVN 4582, July 28, 2013.  
URL: <http://mirror.ctan.org/macros/latex/contrib/l3packages/>.



## C. Index

<b>A</b>	
<code>\addbonus</code> .....	16
<code>\addpoints</code> .....	15 ff.
ALEXANDER, Jason .....	3 f.
<code>all</code> .....	32
answers (package) .....	3
ARSENEAU, Donald .....	3
ASSAIL, Forkrul .....	52
<code>auto-label</code> .....	6, 8, 11, 28, 33 f.
<b>B</b>	
babel (package) .....	15
BEZOS, Javier .....	4
<code>\blank</code> .....	35 f., 55
<code>\bonus</code> .....	16
<code>bonus-format</code> .....	18
<code>bonus-name</code> .....	17
<code>bonus-plural</code> .....	17
<code>\bonussum</code> .....	16, 18
BRAGAGLIA, Stefano .....	52
<b>C</b>	
<code>\C</code> .....	21 f., 24, 30
<code>chapter-hook</code> .....	6, 20
<code>class</code> .....	11
cleveref (package) .....	6
Computer Modern Typefaces .....	28, 55
Computers & Typesetting .....	55
<code>counter-format</code> .....	8, 14, 27
<code>counter-within</code> .....	8
CTAN .....	3, 5
<code>\currentbonussum</code> .....	16
<code>\currentpointssum</code> .....	16
<code>\CurrentQuestionID</code> .....	12 f., 22
<b>D</b>	
DAEMS, Walter .....	3
<code>\DebugExSheets</code> .....	22
<code>\DeclareQuestionClass</code> .....	25 f.
<code>\DeclareQuestionProperty</code> .....	26
<code>\DeclareRelGrades</code> .....	31
<code>difficulty</code> .....	25
<b>E</b>	
enumerate (environment) .....	16
enumitem (package) .....	4
environ (package) .....	3, 52
eqexam (package) .....	3
esami (package) .....	3
etoolbox (package) .....	3
exam (package) .....	3
examdesign (package) .....	3 f.
<code>\examspace</code> .....	36 f.
<code>exclude</code> .....	32
exercise (package) .....	3
<code>\exlabel</code> .....	22
exsol (package) .....	3
<b>F</b>	
<i>Fixing lstlisting inside <b>ExSHEETS</b> question and solution environments</i> .....	52
<code>\ForEachQuestion</code> .....	29
<code>format</code> .....	18
<b>G</b>	
<code>\GetQuestionClass</code> .....	6, 26
<code>\GetQuestionProperty</code> .....	12, 27 ff.
GOOSSENS, Michel .....	28
<code>\grade</code> .....	31
<b>H</b>	
<code>half</code> .....	31
<code>headings</code> .....	8, 39
<code>headings-format</code> .....	8
HIRSCHHORN, Philip .....	3
<i>How do I extract repeated functionality (<b>ExSHEETS</b> workaround) to make it reusable?</i> .....	52
hyperref (package) .....	22
<b>I</b>	
<code>ID</code> .....	11
<code>IDs</code> .....	32
<code>\IfInsideQuestionF</code> .....	10
<code>\IfInsideQuestionT</code> .....	10
<code>\IfInsideQuestionTF</code> .....	10
<code>\iflastquestion</code> .....	29
<code>\IfQuestionSubtitleF</code> .....	12 f.
<code>\IfQuestionSubtitleT</code> .....	12
<code>\IfQuestionSubtitleTF</code> .....	12
<code>\includequestions</code> .....	31 ff.
<b>K</b>	
KERN, Uwe .....	3
KLETZING, Dennis .....	4
KNUTH, Donald E. ....	28
<b>L</b>	
<code>l3experimental</code> (package) .....	3
<code>l3kernel</code> (package) .....	3 f.
<code>l3keys2e</code> (package) .....	3
<code>l3packages</code> (package) .....	3 f.
<code>l3sort</code> (package) .....	3, 23

## INDEX

58

## INDEX

TikZ/pgf (package) .....	3	<b>V</b>	
toc-level .....	8	\variant .....	30
topic .....	11	\vary .....	30
\totalpoints .....	16, 18	VASSALLO, Salvatore .....	3
totoc .....	8		
translations (package) .....	4 ff., 15	<b>W</b>	
type .....	11 f.	width .....	35
		WRIGHT, Joseph .....	3
<b>U</b>			
ulem (package) .....	3, 35	<b>X</b>	
use .....	11 f., 19	xcoffins (package) .....	37, 39
use-classes .....	23, 25	xcolor (package) .....	3
use-name .....	17	xparse (package) .....	3
use-ref .....	9, 21 f.	xtemplate (package) .....	3, 7, 37
use-topics .....	24 f.		