

# EXSHEETS

VO.3 2012/10/23

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

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English documentation

**EXSHEETS** provides means to create exercises or questions and their corresponding solutions. The questions can be divided into classes and/or topics 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.

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# Part I

## Preliminary

### 1 Licence and Requirements

**ExSHEETS** is placed under the terms of the LaTeX Project Public License, version 1.3 or later (<http://www.latex-project.org/lppl.txt>). It has the status “maintained.”

**ExSHEETS** loads and needs the following packages: `l3kernel`, `xparse`,<sup>1</sup> `xtemplate`,<sup>2</sup> `l3sort`,<sup>3</sup> `l3keys2e`,<sup>4</sup> `xcolor`,<sup>5</sup> `ulem`,<sup>6</sup> `etoolbox`,<sup>7</sup> `environ`,<sup>8</sup> `lcg`<sup>9</sup> and `silence`.<sup>10</sup> **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: `exam`<sup>11</sup> [4], `examdesign`<sup>12</sup> [1], `exercise`<sup>13</sup> [12], `probsoln`<sup>14</sup> [14], `answers`<sup>15</sup> [13] (and many more).

One thing I missed in all packages that I’ve tried out<sup>16</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 5.9.

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 section 5.12). I am not quite content with it as it works now, though.<sup>17</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`, for example. Or exploit the possibilities `enumitem`<sup>18</sup> [2] gives you.

---

<sup>1</sup> CTAN: `xparse`   <sup>2</sup> CTAN: `xtemplate`   <sup>3</sup> CTAN: `l3sort`   <sup>4</sup> CTAN: `l3keys2e`   <sup>5</sup> CTAN: `xcolor`   <sup>6</sup> CTAN: `ulem`   <sup>7</sup> CTAN: `etoolbox`   <sup>8</sup> CTAN: `environ`   <sup>9</sup> CTAN: `lcg`   <sup>10</sup> CTAN: `silence`   <sup>11</sup> CTAN: `exam`  
<sup>12</sup> CTAN: `examdesign`   <sup>13</sup> CTAN: `exercise`   <sup>14</sup> CTAN: `probsoln`   <sup>15</sup> CTAN: `answers`   <sup>16</sup> Well, probably I didn’t try hard enough...   <sup>17</sup> 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 [5].   <sup>18</sup> CTAN: `enumitem`

I had the idea for this package in 2008. Back then my  $\text{\TeX}$  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  $\text{\LaTeX}$  packages like `l3kernel` and `l3packages`. 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 (October 23, 2012) 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 three packages: `ExSHEETS`, `TRANSLATIONS` and `CNTFORMATS`. `TRANSLATIONS` is described in part III and `CNTFORMATS` in part IV. These two packages provide functionality that is used by `ExSHEETS`. They can, however, be used independently from `ExSHEETS`.

### 4 Installation

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

```
exsheets_headings.def
exsheets_headings.cfg
exsheets_tasks.def
exsheets_tasks.cfg
```

in the same directory as the `exsheets.sty` file.<sup>19</sup> You *can* install the other two packages, `TRANSLATIONS` and `CNTFORMATS`, in different locations but since they belong to `ExSHEETS` they probably should be placed in the same directory.

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.

## Part II

# The `ExSHEETS` package

### 5 Package Usage

#### 5.1 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`:

---

<sup>19</sup> That is, a directory like `texmf-local/tex/latex/exsheets`, probably

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

These options are described in section 5.2.

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 6 on page 33 ff.

## 5.2 Package Options

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

- `color` = <colour> Default: `exsheetsblue`  
A custom colour that is used in certain but very rare circumstances.
- `counter-format` = <counter-format> Default: `qu.`  
Formatting of the counter of the questions. This option takes a special kind of string that is described in section 5.3.5.
- `counter-within` = <counter> (initially empty)  
Resets the question counter with every step of <counter>.
- `headings` = <instance> Default: `block`  
Choose the style of the questions' and solutions' headings. There are two predefined styles: `block` and `runin`.

- ▶ `headings-format = <code>` Default: `\normalsize\bfseries`  
This code is placed immediately before the headings of the questions and solutions.
- ▶ `load-headings = true|false` Default: false  
Loads additional styles for the headings. More on this is described in section 6.2.
- ▶ `load-tasks = true|false` Default: false  
Loads additional styles for the tasks environment. See section 5.12.
- ▶ `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 = <toc level>` Default: subsection  
This option sets the level in which questions and solutions should appear in the table of contents.
- ▶ `questions-toc-level = <toc level>` 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 5.6.2 for details.

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

### 5.3 Create Questions/Exercises and their Solutions

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

#### 5.3.1 The question Environment

Questions are written inside the question environment:

- ▶ `\begin{question}[<options>]{<points>} ... \end{question}`

```

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.**

3 P.

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

These points are saved internally (see section 5.4 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 `<point>+<bonus points>` 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.**

1 (+1) P.

This question is worth 1 point and 1 bonus point.

**Exercise 4.**

(+3 P.)

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

Introduced in  
version 3.0

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

▷ `\IfInsideQuestionT{<true code>}`

▷ `\IfInsideQuestionF{<false code>}`

### 5.3.2 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 ▶ print = true|false** Default: true  
 prints or hides the question.
- question ▶ ID = <id>** (initially empty)  
 assigns a custom ID to the question. See section 5.6.3 for further information.
- question ▶ class = <class>** (initially empty)  
 assigns a class to the question. See section 5.7 for further information.
- question ▶ topic = <topic>** (initially empty)  
 assigns a topic to the question. See section 5.8 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 \texttt{exam}. The default name has changed
   from
3   ‘‘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 5.

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

#### Fancy name 6.

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.

### 5.3.3 The solution Environment

If you want to save/print (more on the exact usage in section 5.6) a solution you have to use the solution environment *after* the question it belongs to and *before* the next question.

► `\begin{solution}[<options>] ... \end{solution}`

```

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 8.

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!

### 5.3.4 Options to the solution Environment

The solutions environment also has options, namely these:

`solution` ► `name = <name>` (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.

## 5 Package Usage

```
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 9.

5 P.

The solution to this questions gets printed where it is.

### Solution 9.

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

### Exercise 10.

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 10.

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

### 5.3.5 Setting the Counter

The package option `counter-format` allows you to specify how the question counter 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 section 5.12), 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 5 (k)**

A question with a differently formatted number.

**5.3.6 Language Settings**

The names of the questions and solutions are language dependent. If you use babel<sup>20</sup> or polyglossia<sup>21</sup> **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>22</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}
2   {\O{ }velse}
3 \DeclareTranslation{Danish}{exsheets-question-name}
4   {Opgave}
5 \DeclareTranslation{Danish}{exsheets-solution-name}
6   {Opl\O{ }sning}

```

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

**5.4 Counting Points****5.4.1 The Commands**

You have seen in section 5.3.1 that you can assign points to a question. If you do so these points are printed into the margin<sup>23</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.

► **\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.

<sup>20</sup> CTAN: babel    <sup>21</sup> CTAN: polyglossia    <sup>22</sup> contact@mychemistry.eu    <sup>23</sup> Well, not necessarily. It depends on the heading style you have chosen.

► `\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”: 63.75 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”: 63.75 (+4) P. The starred version prints the sum of the points without “unit”: 63.75 (+4).

The commands `\pointssum`, `\bonussum` and `\totalpoints` need at least *two*  $\LaTeX$  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:

<pre> 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} </pre>	<div> <b>Exercise 12.</b> <div>4 P.</div> <div>           a) blah (1 P.)            b) blah (1 P.)            c) blah (1 P.)            d) blah (1 P.) </div> </div> <div> <b>Exercise 13.</b> <div>           a) blah (1 P.)            b) blah (1 P.)            c) blah (1 P.)            d) blah (1 P.) </div> </div>
---	---

### 5.4.2 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` ► `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: (+

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 14.****1 point**

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

**Exercise 15.****7.5 points**

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

**5.5 A Grade Distribution**

Probably this is a rather esoteric feature but it could prove 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
15   & $\le\grade*{2,5}$ & & $\le\grade*{3}$ & & $\le\grade*{3,5}$ & & $<\grade
16   & $\le\grade*{4}$ & & \\
17 Note
18   & 1 & 1--2 & 2 & 2--3 & 3 & 3--4 & 4 & 5
19 \end{tabular}

```

Punkte	63.75	≤	63.75	≤	58	≤	53	≤	48	≤	43	≤	37	<	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.

## 5.6 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 command

► `\printsolutions[<setting>]`

is discussed.

Before we do that a hint: remember that you can set the option `print` globally:

```
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>}`

► `\PrintSolutionsT{<true code>}`

► `\PrintSolutionsF{<false code>}`

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.

### 5.6.1 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 8.**

This is the solution to exercise 8!

**Solution 9.**

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

**Fancy name 10.**

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

**5.6.2 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>24</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   \cmd{printsolutions}.
7 \end{solution}
8 And now:
9 \printsolutions[section]
```

<sup>24</sup> Only if the document class you're using *has* chapters, of course!



**Exercise 16.**

This is the first and only question in this section.

And now:

**Solution 8.**

This is the solution to exercise 8!

**Solution 9.**

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

**Fancy name 10.**

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

**Solution 16.**

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}]
```

**Solution 8.**

This is the solution to exercise 8!

**Solution 9.**

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

**Fancy name 10.**

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

**Solution 16.**

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

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>25</sup> and greater.

<sup>25</sup> Or rather where `\value{section}` is 10 or greater – the actual counter formatting is irrelevant.

## 5 Package Usage

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 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`<sup>26</sup> 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  $\LaTeX$  run before `\S` and `\C` can pass them on to `\printsolutions`.

### 5.6.3 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}`

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

---

<sup>26</sup> CTAN: hyperref

## 5 Package Usage

```
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 17.**

A question with a nice ID!

**ID: 18 Exercise 18.**

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 8.**

This is the solution to exercise 8!

**Fancy name 10.**

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

**Solution 17.**

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.

### 5.7 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={easy,hard}}
2 \begin{question}[class=easy]
3   This one's easy.
4 \end{question}
5 \begin{question}[class=middle]
6   This one's a little bit harder.
7 \end{question}
8 \begin{question}[class=hard]
9   Let's see if you can solve this one!
10 \end{question}

```

**Exercise 19.**

This one's easy.

**Exercise 20.**

Let's see if you can solve this one!

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

## 5.8 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 21.**

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.

### 5.9 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.

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.

Let's say we have declared the properties points, notes, reference and topic. Then we can do the following:

## 5 Package Usage

```

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

```

### Exercise 22.

3 P.

Explain how you could center text in a  $\TeX$  document.

### Exercise 23.

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	
22.	Points	3
	Topic	T <sub>E</sub> X/L <sup>A</sup> T <sub>E</sub> X
	References	Goossens, Mittelbach, and Samarin [3]
	Note	How to center text.
23.	Points	2
	Topic	T <sub>E</sub> X/L <sup>A</sup> T <sub>E</sub> X
	References	Knuth [7, 8, 9, 10, 11]
	Note	Books by Knuth.

Introduced in  
version 3.0

There are additional commands that might prove useful:

- `\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   &
5   Total \\ \hline
6 Points &
7   \ForEachQuestion{\GetQuestionProperty{points}{#1}\
8   iflastquestion{}}{\&}} &
9   \pointssum* \\ \hline
10 Reached &
11   \ForEachQuestion{\iflastquestion{}}{\&}} & \\ \hline
12 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.)

### 5.10 Selectively Include Questions from External Files

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>}`

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 `lcg` package to create the pseudo-random numbers.

`include` ► `seed = <num>` Default: -1  
Sets the seed for the pseudo-random numbers.

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 do that or use one of the following commands for control:

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

► `\PrintIfIncludeActiveT{<true code>}`

► `\PrintIfIncludeActiveF{<false code>}`

If you use the `random` option you need to be aware of the following facts: the options `use-classes`, `use-topics` and `question/print` are not considered when selecting the questions which means you might end up with less questions included than you've specified. The option `question/use` is also not taken into consideration. In fact it is completely ignored and the questions are included anyway. I'm still not sure this is a feature or a bug...

Introduced in  
version 3.0

## 5.11 Own Question/Solution Pairs

**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>]{<solution>}[<solution options>]`
- `\RenewQuSolPair{<question>}[<question options>]{<solution>}[<solution options>]`

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 % \NewQuSolPair
3 % {question*}[name=\llap{$\bigstar$\space}Bonus Question]
4 % {solution*}[name=\llap{$\bigstar$\space}Solution]
5 \begin{question*}
6   This is a bonus question.
7 \end{question*}
8 \begin{solution*}[print]
9   This is what the solution looks like.
10 \end{solution*}
```

### ★ Bonus Question 24.

This is a bonus question.

### ★ Solution 24.

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.

## 5.12 The tasks Environment

### 5.12.1 How it works

The tasks environment is similar to a list like `enumerate` but not the same. The first difference: there is no pagebreak possible inside an item but only between items. The second difference: the enumeration default is a), b), c) ... The third difference: the input syntax:

- `\begin{tasks}[<options>]{<num of columns>} list of tasks, each ended by a semicolon \end{tasks}`

## 5 Package Usage

Let's use some sample text in the next few examples:

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

```
1 Some text before the list.
2 \begin{tasks}
3   \sample ;
4   \sample ;
5   \sample ;
6 \end{tasks}
7 And also some text after it.
```

Some text before the list.

- a) 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.
- b) 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.
- c) 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.

And also some text after it.

The environment takes the optional argument `{<num of columns>}` with which the number of columns used by the environment is specified.

```
1 \begin{tasks}{2}
2   \sample ;
3   \s\ \s ;
4   \s ;
5   \sample ;
6   \s\par\s ;
7 \end{tasks}
```

- |   |   |
|---|---|
| <p>a) 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.<br/>This is some sample text we will use to create a somewhat longer text spanning a few lines.</p> | <p>b) 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.</p>   |
| <p>c) This is some sample text we will use to create a somewhat longer text spanning a few lines.</p>   | <p>d) 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.<br/>This is some sample text we will use to create a somewhat longer text spanning a few lines.</p> |
| <p>e) This is some sample text we will use to create a somewhat longer text spanning a few lines.<br/>This is some sample text we will use to create a somewhat longer text spanning a few lines.</p>   |   |

### 5.12.2 Available Options

The environment has some options, namely these:

- tasks** ► **style** = <instance> (initially empty)  
Choose the instance to be used. Read more on this in section 6.3.
- tasks** ► **label** = <label specs> (initially empty)  
Sets a custom label. The letters tsk are replaced with the task-counter. An optional argument directly following these letters specifies the counter format: 1: \arabic, a: \alph, A: \Alph, r: \roman and R: \Roman.
- tasks** ► **label-width** = <dim> Default: 3ex  
Sets the width of the item labels.
- tasks** ► **before-skip** = <skip> Default: .33\baselineskip  
Sets the skip before the list.
- tasks** ► **after-skip** = <skip> Default: .33\baselineskip  
Sets the skip after the list.

Now the same list as above but with three columns and a different label:

```

1 \begin{tasks}[label=(tsk[r]),label-width=4ex]{3}
2   \sample ;
3   \s\ \s ;
4   \s ;
5   \sample ;
6   \s\par\s ;
7 \end{tasks}

```

- |   |   |  |
|---|---|--|
| <p>(i) 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.</p>  | <p>(ii) 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.</p> | <p>(iii) This is some sample text we will use to create a somewhat longer text spanning a few lines.</p> |
| <p>(iv) 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.</p> | <p>(v) 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.</p>  |  |

Let's use it inside a question:

## 5 Package Usage

```
1 \SetupExSheets[tasks]{label=qu.tsk,label-width=5ex}
2 \begin{question}[type=exam]{4}
3 I have these two tasks for you. Shall we begin?
4 \begin{tasks}{2}
5 The first task: easy! ;
6 The second task: even more so! ;
7 \end{tasks}
8 \end{question}
9 \begin{solution}[print]
10 Now, let's see\ldots\ ah, yes:
11 \begin{tasks}
12 This is the first solution. Told you it was easy. ;
13 This is the second solution. And of course you knew that! ;
14 \end{tasks}
15 \end{solution}
```

### Question 25.

4 P.

I have these two tasks for you. Shall we begin?

25.1 The first task: easy!

25.2 The second task: even more so!

### Solution 25.

Now, let's see... ah, yes:

25.1 This is the first solution. Told you it was easy.

25.2 This is the second solution. And of course you knew that!

### 5.12.3 Available Instances

When you use the package option `load-tasks` there are currently three additional instances for the tasks are available:

**itemize** uses `\labelitemi` as labels.

**enumerate** enumerates the items with 1., 2., ...

**multiplechoice** a – well – ‘multiple choice’ list.

```

1 \begin{tasks}[style=itemize]{2}
2   that's just how\ldots ;
3   \ldots we expected ;
4 \end{tasks}
5 \begin{tasks}[style=enumerate]{2}
6   that's just how\ldots ;
7   \ldots we expected ;
8 \end{tasks}
9 \begin{tasks}[style=multiplechoice]{2}
10  that's just how\ldots ;
11  \ldots we expected ;
12 \end{tasks}

```

- |   |   |
|---|---|
| • that's just how...                        | • ...we expected                        |
| 1. that's just how...                       | 2. ...we expected                       |
| <input type="checkbox"/> that's just how... | <input type="checkbox"/> ...we expected |

#### 5.12.4 Custom Labels

If you want to change a single label inside a list, you can use

► `\task{<label>}`

in one of the tasks. This will temporarily overwrite the default label.

1 \begin{tasks}[style=itemize]	• a standard item
2 a standard item ;	• another one
3 another one ;	
4 \task{+}a different one ;	+ a different one
5 and another one ;	
6 \end{tasks}	• and another one

### 5.13 Filling in the Blanks

#### 5.13.1 Cloze

Changed in  
version 3.0

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

---



---



---

- `\blank* [<options>] {<text to be filled in>}`  
 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.

`blank` ► `width` = `<dim>` (initially empty)  
 The width of the line. If it is not used the width of the filled in text is used.

`blank` ► `linespread` = `<num>` 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 \cmd{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 \cmd{blank}
9   \blank[style=dashed]{command}.
10 \end{solution}
```

### Exercise 26.

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

### Solution 26.

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



### 5.13.2 Vertical Space for answers

Introduced in  
version 3.0

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 27.**  
 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.

## 6 Styling your Exercise/Exam Sheets

### 6.1 Background

The **ExSHEETS** package makes extensive use of  $\text{\LaTeX}$ 3's coffins<sup>27</sup> as well as its templates concept.<sup>28</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.

<sup>27</sup> See the documentation to the xcoffins package for more information on that. <sup>28</sup> Have a look into the documentation to the xtemplate package.

What this package doesn't provide is changing the background of questions or framing them. But this is easily possible using the `mdframed`<sup>29</sup> package and its `\surroundwithmdframed` command.

## 6.2 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}

```

**Exercise 28.** 1 P.  
a 'block' heading

**Exercise 29.** a 'runin' heading 1 P.

### 6.2.1 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 {
3   % option      : type      = default
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  points-format   : tokenlist =      ,
20  points-pre-code : tokenlist =      ,
21  points-post-code : tokenlist =      ,
22  join           : tokenlist =      ,

```

<sup>29</sup> CTAN: mdframed

## 6 Styling your Exercise/Exam Sheets

```

23   attach          : tokenlist =
24   }

```

Each heading is built with at most four coffins available with the names ‘main’, ‘title’, ‘number’ and ‘points’. Those coffins place possibly the whole heading, the title, 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) the syntax is the same.

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

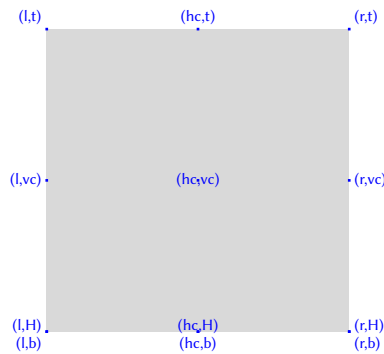


FIGURE 2: Available handles for a horizontal coffin.

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 = <instance>`.

### 6.2.2 The ‘block’ Instance

```

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

```

```

8      }
9  }

```

**Exercise 30.**

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.

**6.2.3 The ‘runin’ Instance**

```

1  \DeclareInstance{exsheets-heading}{runin}{default}
2  {
3      runin          = true ,
4      number-post-code = \space ,
5      attach         =
6      { main[l,vc]points[l,vc](\linewidth+\marginparsep,0pt) }
7      ,
8      join           =
9      {
10         main[r,vc]title[r,vc](0pt,0pt) ;
11         main[r,vc]number[l,vc](1ex,0pt)
12     }
13 }

```

**Exercise 31.** 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.

**6.2.4 The ‘simple’ Instance**

```

1  \DeclareInstance{exsheets-heading}{simple}{default}
2  {
3      title-format    = \normalsize ,
4      points-pre-code = ( ,
5      points-post-code = ) ,
6      attach          = { main[l,t]number[l,t](0pt,0pt) } ,
7      join            =
8      {
9          number[r,b]title[l,b](1ex,0pt) ;
10         main[l,b]points[l,t](1em,0pt)
11     }
12 }

```

**32. Exercise**  
(1P.)

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.

**6.2.5 The 'block-rev' Instance**

```

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

**33. Exercise**

1P.

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.

**6.2.6 The 'block-wp' Instance**

```

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

**Exercise 34.** (1P.)

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.

## 6 Styling your Exercise/Exam Sheets

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

### 6.2.7 The ‘block-wp-rev’ Instance

```
1 \DeclareInstance{exsheets-heading}{block-wp-rev}{default}
2 {
3   toc-reversed      = true ,
4   points-pre-code   = ( ,
5   points-post-code  = ) ,
6   join              =
7   {
8     number[r,B]title[l,B](1ex,0pt) ;
9     number[r,B]points[l,B](1ex,0pt)
10  } ,
11   attach            = { main[l,vc]number[l,vc](0pt,0pt) }
12 }
```

#### 35. Exercise (1P.)

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.

### 6.2.8 The ‘block-nr’ Instance

```
1 \DeclareInstance{exsheets-heading}{block-nr}{default}
2 {
3   attach            =
4   {
5     main[l,vc]number[l,vc](0pt,0pt) ;
6     main[r,vc]points[l,vc](\marginparsep,0pt)
7   }
8 }
```

#### 36.

1P.

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.

### 6.2.9 The ‘block-nr-wp’ Instance

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

### 37. (1P.)

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.

#### 6.2.10 The ‘runin-rev’ Instance

```
1 \DeclareInstance{exsheets-heading}{runin-rev}{default}
2 {
3   toc-reversed      = true ,
4   runin             = true ,
5   title-post-code   = \space ,
6   attach            =
7     { main[l,vc]points[l,vc](\linewidth+\marginparsep,0pt) }
8   ,
9   join              =
10    {
11      main[r,vc]number[r,vc](0pt,0pt) ;
12      main[r,vc]title[l,vc](1ex,0pt)
13    }
14 }
```

**38. 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. 1P.

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

#### 6.2.11 The ‘runin-wp’ Instance

```
1 \DeclareInstance{exsheets-heading}{runin-wp}{default}
2 {
3   runin             = true ,
4   points-pre-code   = ( ,
5   points-post-code   = )\space ,
6   join              =
```

## 6 Styling your Exercise/Exam Sheets

```
7      {
8          main[r,vc]title[r,vc](0pt,0pt) ;
9          main[r,vc]number[l,vc](1ex,0pt) ;
10         main[r,vc]points[l,vc](1ex,0pt)
11     }
12 }
```

**Exercise 39.** (1P.) 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.

### 6.2.12 The ‘runin-wp-rev’ Instance

```
1  \DeclareInstance{exsheets-heading}{runin-wp-rev}{default}
2  {
3      toc-reversed      = true ,
4      runin             = true ,
5      points-pre-code   = ( ,
6      points-post-code = )\space ,
7      join              =
8      {
9          main[r,vc]number[r,vc](0pt,0pt) ;
10         main[r,vc]title[l,vc](1ex,0pt) ;
11         main[r,vc]points[l,vc](1ex,0pt)
12     }
13 }
```

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

### 6.2.13 The ‘runin-nr’ Instance

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



**41.** 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.

#### 6.2.14 The ‘runin-fixed-nr’ Instance

```

1  \DeclareInstance{exsheets-heading}{runin-fixed-nr}{default}
2  {
3    runin          = true ,
4    number-pre-code = \hbox to 2em \bgroup ,
5    number-post-code = \hfil\egroup ,
6    attach         =
7      { main[l,vc]points[l,vc](\linewidth+\marginparsep,0pt) }
8    ,
9    join           = { main[r,vc]number[l,vc](0pt,0pt) }
10 }

```

**42.** 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.

#### 6.2.15 The ‘runin-nr-wp’ Instance

```

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

```

**43.** (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.

#### 6.2.16 The ‘centered’ Instance

```

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

```

### Exercise 44.

1P.

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.

#### 6.2.17 The ‘centered-wp’ Instance

```

1 \DeclareInstance{exsheets-heading}{centered-wp}{default}
2 {
3   points-pre-code = ( ,
4   points-post-code = ) ,
5   join           =
6     {
7       title[r,B]number[l,B](1ex,0pt) ;
8       title[r,B]points[l,B](1ex,0pt)
9     } ,
10  attach          = { main[hc,vc]title[hc,vc](0pt,0pt) }
11 }

```

### Exercise 45. (1P.)

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.

#### 6.2.18 The ‘margin’ Instance

```

1 \DeclareInstance{exsheets-heading}{margin}{default}
2 {
3   runin          = true ,
4   number-post-code = \space ,
5   points-pre-code = ( ,
6   points-post-code = )\space ,

```

## 6 Styling your Exercise/Exam Sheets

```
7      join          = { title[r,b]number[l,b](1ex,0pt) } ,
8      attach        =
9      {
10         main[l,vc]title[r,vc](0pt,0pt) ;
11         main[l,b]points[r,t](0pt,0pt)
12     }
13 }
```

**Exercise 46.** A ‘margin’ heading. This is some sample text we will use to create a somewhat longer text (1P.) 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.

### 6.2.19 The ‘margin-nr’ Instance

```
1  \DeclareInstance{exsheets-heading}{margin-nr}{default}
2  {
3      runin = true ,
4      attach =
5      {
6          main[l,vc]number[r,vc](-1ex,0pt) ;
7          main[r,vc]points[l,vc](\linewidth+\marginparsep,0pt)
8      }
9  }
```

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

### 6.2.20 The ‘raggedleft’ Instance

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

**Exercise 48.** 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.

**6.2.21 The ‘fancy’ Instance**

```

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

1 P.

**49. 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.

**6.2.22 The ‘fancy-wp’ Instance**

```

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

```

13   join          =
14   {
15       number[r,B]title[l,B](1ex,0pt) ;
16       number[r,B]points[l,B](1ex,0pt)
17   } ,
18   attach        = { main[hc,vc]number[hc,vc](0pt,0pt) }
19   }

```

---

### 50. EXERCISE (1P.)

---

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.

## 6.3 The exsheets-tasks Object

The second object that’s defined by **ExSHEETS** is the ‘exsheets-tasks’ object. This time there are four instances available for the one template (again ‘default’) that was defined.

### 6.3.1 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 some examples of their usage.

```

1  \DeclareTemplateInterface{exsheets-tasks}{default}{3}
2  {
3      % option      : type      = default
4      enumerate    : boolean   = true      ,
5      label        : tokenlist
6      indent       : length    = 2.5em     ,
7      label-format  : tokenlist = tsk[a])   ,
8      label-width   : length    = 3ex      ,
9      after-item-skip : length  = 2ex
10 }

```

### 6.3.2 Predefined Instances

This is rather brief this time:

```

1  % ALPHABETIZE: a) b) c)
2  \DeclareInstance{exsheets-tasks}{alphabetize}{default}{}
3  % available when ‘load-tasks=true’:
4  % ITEMIZE:
5  \DeclareInstance{exsheets-tasks}{itemize}{default}{}

```

```

6 { enumerate = false }
7 % ENUMERATE:
8 \DeclareInstance{exsheets-tasks}{enumerate}{default}
9 { label-format = tsk. }
10 % MULTIPLECHOICE:
11 \DeclareInstance{exsheets-tasks}{multiplechoice}{default}
12 {
13     enumerate = false ,
14     label = \choicebox ,
15 }

```

## 6.4 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 **TRANSLATIONS** package

### 7 Motivation

I wrote this package when I was in need for an expandable version of translator's `\translate`. If you don't need that then there is no need whatsoever for this package as translator from the beamer<sup>30</sup> bundle provides all the functionality **TRANSLATIONS** does (except for: translator's `\translate` isn't expandable, `\GetTranslation` is.).

### 8 Usage

These are the commands provided by **TRANSLATIONS**:

- ▶ `\DeclareLanguage{<lang>}`  
Declare a language that can be used by **TRANSLATIONS**. If the language already exists it will be silently redefined. This command can only be used in the preamble.
- ▶ `\DeclareLanguageAlias{<lang2>}{<lang1>}`  
Declares `<lang2>` to be an alias of `<lang1>`. If `<lang1>` doesn't exist yet a warning will be raised and it will be defined. This command can only be used in the preamble.
- ▶ `\NewTranslation{<lang>}{<key>}{<translation>}`  
Defines a translation of key `<key>` for the language `<lang>`. An error will be raised if a translation of `<key>` already exists. This command can only be used in the preamble.

---

<sup>30</sup> CTAN: beamer

- ▶ `\RenewTranslation{<lang>}{<key>}{<translation>}`  
Redefines a translation of key <key> for the language <lang>. An error will be raised if no translation of <key> exists. This command can only be used in the preamble.
- ▶ `\DeclareTranslation{<lang>}{<key>}{<translation>}`  
Defines a translation of key <key> for the language <lang>. No error will be raised if a translation of <key> already exists. This command can only be used in the preamble.
- ▷ `\GetTranslationFor{<lang>}{<key>}`  
Fetches and prints the translation of <key> for the language <lang>. This command is expandable.
- ▷ `\GetTranslation{<key>}`  
Fetches and prints the translation of <key> for the currently active language (as for example set by babel). This command is expandable.
- ▶ `\SaveTranslationFor{<cmd>}{<lang>}{<key>}`  
Fetches and saves the translation of <key> for the language <lang> in the macro <cmd>.
- ▶ `\SaveTranslation{<cmd>}{<key>}`  
Fetches and saves the translation of <key> or the currently active language (as for example set by babel) in the macro <cmd>.
- ▶ `\LoadDictionary{<name>}`  
Loads a file named <name>-<lang>.trsl where <lang> corresponds to the lowercase name of the current language as defined with `\DeclareLanguage`. This file should contain the translations for the specified language.
- ▶ `\LoadDictionaryFor{<lang>}{<name>}`  
Loads a file named <name>-<lang>.trsl.

Quite a number of languages already are defined, either directly or via an alias. So, before you define a language you should take a look in `translations.sty` if the language doesn't already exist.

Here is a small example of usage:

```

1 % in the preamble:
2 % \DeclareTranslation{English}{Kueche}{kitchen}
3 % \DeclareTranslation{German}{Kueche}{K\"uche}
4 % \DeclareTranslation{Spanish}{Kueche}{cocina}
5 % \DeclareTranslation{French}{Kueche}{cuisine}
6
7 \GetTranslation{Kueche}
8 \SaveTranslation\kitchen{Kueche}
9 \SaveTranslationFor\cuisine{french}{Kueche}
10
11 \selectlanguage{ngerman}
12 \GetTranslation{Kueche} \kitchen \GetTranslationFor{spanish}{Kueche}
13 \cuisine

```

kitchen Küche kitchen cocina cuisine
---

A typical dictionary file should look as follows:

```

1 % this is file housing-german.trsl
2 \ProvideDictionaryFor{german}{housing}[<version info>]
3 \DeclareTranslation{German}{kitchen (housing)}{K\"uche}
4 \DeclareTranslation{German}{bathroom (housing)}{Bad}
5 \DeclareTranslation{German}{living room (housing)}{Wohnzimmer}

6 \DeclareTranslation{German}{bedroom (housing)}{Schlafzimmer}
7 ...
8 \endinput

```

## Part IV

# The **CNTFORMATS** package

### 9 Motivation

**CNTFORMATS** provides a way to format counters with what I will call patterns. This does not in any way effect the usual  $\LaTeX$  2 $\epsilon$  way of treating counters and does not use `\the<counter>` nor is it affected by the redefinition of them.

This package is aimed at package or class authors and probably not very useful for document authors.

### 10 Example

A use case typically looks as follows:

<pre>1 \ReadCounterPattern{se.sse}</pre>	10.0
--	------

where the key `se` stands for the current value of the section counter and `sse` for subsection, respectively. `se.sse` is an example for what will be called *pattern*. The keys for the counters can have optional arguments that specify the format:

<pre>1 \stepcounter{subsection} 2 \ReadCounterPattern{se[A](sse[r])}</pre>	J(i)
--	------

`A` stands for `\Alph` and `r` for `\roman`. A complete list can be found in table 2 on page 51. As you can see you can insert arbitrary other tokens in a pattern that won't be changed.



## 11 Usage

In order to make counters known to **CNTFORMATS** the following commands are used:

- ▶ `\AddCounterPattern* [<module>]{<counter>}{<pattern>}`  
This command will make the (existing) counter <counter> known to **CNTFORMATS** and assign the pattern <pattern> to it.
- ▶ `\NewCounterPattern* [<module>]{<counter>}{<pattern>}`  
This command will create a new counter <counter>, make it known to **CNTFORMATS** and assign the pattern <pattern> to it.
- ▶ `\ReadCounterFrom [<module>]{<counter>}{<internal cmd>}`  
If you use one of the commands above with the starred version the number for the pattern is not automatically fetched from the internal `\c@<counter>`. This can now be assigned with `\ReadCounterFrom` where <internal cmd> is the macro that holds the number.

The commands above can only be used in the document preamble.

After the creation of these pattern markers one wants to be able to use them. There are a number of macros that allow different aspects of usage.

- ▶ `\ReadCounterPattern [<module>]{<pattern>}`  
Reads, interprets and prints a pattern.
- ▷ `\@cntfmts@parsed@pattern`  
After `\ReadCounterPattern` has been used the current pattern interpretation is stored in this macro. The *interpretation* is *not* what is printed. See the examples below for details.
- ▶ `\ReadCounterPatternFrom [<module>]{<macro that holds pattern>}`  
Reads, interprets and prints a pattern that's stored in a macro.  
Otherwise the same as `\ReadCounterPattern`.
- ▶ `\SaveCounterPattern {<cmd a>}{<cmd b>}{<pattern>}`  
Saves the <pattern> in <cmd a> and the interpreted pattern in <cmd b>.
- ▶ `\eSaveCounterPattern [<module>]{<cmd a>}{<cmd b>}{<pattern>}`  
Saves the <pattern> in <cmd a> and the expanded pattern in <cmd b>.
- ▶ `\SaveCounterPatternFrom [<module>]{<cmd a>}{<cmd b>}{<macro that holds pattern>}`  
Like `\SaveCounterPattern` but reads the pattern from a macro.
- ▶ `\eSaveCounterPatternFrom [<module>]{<cmd a>}{<cmd b>}{<macro that holds pattern>}`  
Like `\eSaveCounterPattern` but reads the pattern from a macro.

The optional argument <module> should be specific for a package, say, so that different patterns for the section for example don't interfere with each other. If you leave the argument the default module **cntfmts** is used.

The **ExSHEETS** packages uses the commands with the module **exsheets**. You can find the following lines in **ExSHEETS**' code:

```

1 \AddCounterPattern*[exsheets]{section}{se}
2 \ReadCounterFrom[exsheets]{section}
3   \l__exsheets_counter_sec_int
4
5 \NewCounterPattern*[exsheets]{question}{qu}
6 \ReadCounterFrom[exsheets]{question}
7   \l__exsheets_counter_qu_int

```

Now let's see a short example that hopefully explains what the macros do:

```

1 % preamble
2 % \NewCounterPattern{testa}{ta}
3 \setcounter{testa}{11}
4 \ReadCounterPattern{ta}
5 \ReadCounterPattern{ta[a]} \
6 \ttfamily\makeatletter
7 \meaning\@cntfmts@parsed@pattern
8
9 \bigskip
10 \SaveCounterPattern\tmpa\tmpb{ta[a]}
11 \meaning\tmpa \
12 \meaning\tmpb
13
14 \bigskip
15 \eSaveCounterPattern\tmpa\tmpb{ta[a]}
16 \meaning\tmpa \
17 \meaning\tmpb

11 k
macro:->{\}\csuse {@cntfmts@read@ta@counter}[a]\relax

macro:->ta[a]
macro:->{\}\csuse {@cntfmts@read@ta@counter}[a]\relax

macro:->ta[a]
macro:->{\}k\relax

```

You can see that somehow additional (empty) groups and a `\relax` found their way into the interpreted and thus the expanded pattern. This is due to the fact that reading optional arguments expandably isn't easy and must have some safety net.

## 12 Predefined Patterns and Formats

**CNTFORMATS** predefines a number of pattern keys. These are listed in table 1.

TABLE 1: Predefined Patterns for the module cntfmts.

counter	pattern
chapter	ch
section	se
subsection	sse
subsubsection	ssse
paragraph	pg

TABLE 2: Predefined Formats

key	format
1	\arabic
a	\alph
A	\Alph
r	\roman
R	\Roman

Table 2 lists the predefined formats. If you want you can add own formats.

► \NewPatternFormat{<pattern>}{<format>}

<format> is a number presentation command like \@alph. This command can only be used in the preamble.

```

1 % preamble
2 % \usepackage{alphalph}
3 % \makeatletter
4 % \NewPatternFormat{aa}{\alphalph@alph}
5 % \makeatother
6 \ReadCounterPattern{se[aa]}

1
```

## Part V

# Appendix

## A List of all Solutions used in this Manual

### Solution 8.

This is the solution to exercise 8!

### Solution 9.

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

### Fancy name 10.

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

### Solution 16.

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

## References

### **Solution 17.**

The solution to the question with the nice ID.

### **Solution 18.**

Yet another solution.

### **Solution 22.**

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.).

### **Solution 23.**

For example two volumes from *Computers & Typesetting*: *T<sub>E</sub>Xbook*, *T<sub>E</sub>X*, *METAFontbook*, *META-FONT*, *Computer Modern Typefaces*. Each valid answer is worth 1 P.

### ★ **Solution 24.**

This is what the solution looks like.

### **Solution 25.**

Now, let's see... ah, yes:

- a) This is the first solution. Told you it was easy.
- b) This is the second solution. And of course you knew that!

### **Solution 26.**

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

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