uioexam — a \LaTeX{} document class for UiO exam problems

Program source code and documentation

Dag Langmyhr
1st July 2015
EXAM PROBLEMS at the University of Oslo must be typeset according to very rigid specifications; two examples are shown in Figures 1 and 2 on pages 2 and 3. The \LaTeX document class uioexam has been written to implement these rules. It is based on the standard \texttt{article} style with the following main modifications:

- The top half of the front page contains a table with the most important information regarding the exam.
- The page header gives the exam subject and the date, and the footer contains a reference to the following page to make sure that no pages are missing.

Program documentation system

This program was documented using the \texttt{web_0} package which is based on Donald Knuth's ideas of \textit{literate programming}. For more information on the \texttt{web_0} implementation, see \url{http://dag.at.ifi.uio.no/public/doc/web0.pdf}.

1 User guide for the \texttt{uioexam} document class

The \texttt{uioexam} document class is used for typesetting exam problems at the University of Oslo. Two simple examples are shown in Figures 1 and 2 on the following pages. (Both examples are two pages long to demonstrate the special page headers and footers.)

1.1 Document class parameters

The \texttt{uioexam} class accepts these parameters:

\texttt{11pt} selects 11 pt type size.\footnote{10 pt type size is not allowed; it is too small for this kind of document.}

\texttt{12pt} chooses 12 pt type size; this is the default.

\texttt{american} or \texttt{USenglish} is used when the exam text is written in American English; this is the default.

\texttt{del} is used for constituent\footnote{A \textit{constituent exam} is an exam which is taken during the term and contributes a certain percentage to the the final grade.} exams which will be marked as “Constituent exam” or “Deleksamen” (depending on the language). This option may be used in combination with the \texttt{ny} and \texttt{utsatt} options.

\texttt{english} or \texttt{UKenglish} is used for British English.

\texttt{exercise} will call the individual questions (created using the \texttt{\oppgave} command) for “Exercises” (see Section 2.3.2.1 on page 9). (This option should only be used for English text.)

\texttt{norsk} is for exams written in Norwegian “Bokmål”.

\texttt{number} will print a small box for the candidate’s number; see an example in the top right-hand corner in Figure 2 on page 3.

\texttt{ny} is for new\footnote{A \textit{new exam} may be taken if you fail the ordinary exam.} exams, and it may be used in combination with the \texttt{del} and \texttt{utsatt} options.

\texttt{nynorsk} is for writing exams in Norwegian “Nynorsk”. 
Oversettelse (vekt 40%) on page 1:

Her er et C-program. Oversett det til Java. (Dette er det første av 3 problemer på 2 sider.)

```c
/* Program 'gcd'
-------------
A function to compute the greatest common divisor.
*/
int LF; /* Line feed */
int gcd (int a, int b) { /* Computes the gcd of a and b. */
    while (a != b) {
        if (a < b) {
            b = b-a;
        } else {
            a = a-b;
        }
    }
    return a;
}
```

Programmering (vekt 50%) on page 2:

Skriv `parse`-metoden til `ifUnit`.

Forklaring (vekt 10%)

Vis hvorledes synkroniseringen med skanneren skjer.

Hva kan du ellers? (vekt 10%)

Skriv om noe du tror du kan.

---

**Figure 1: Norwegian exam demo**
Problem 1 Translation (weight 75%)
Translate this C program into x86 assembly language:

```c
#include <stdio.h>

void rle(char *to, char *from)
{
    char *t = to, *f = from;
    while (*f) {
        char c = *(f++);
        int n = 1;
        while (n<9 && *f==c) {
            ++n; ++f;
        }
        if (n == 1) {
            *(t++) = c;
        } else {
            *(t++) = '#';
            *(t++) = '0'+n;
            *(t++) = c;
        }
    }
    *t = 0;
}
```

(Continued on page 2.)

Problem 2 Multiple choice (weight 25%)
Which of these are legal instruction names in x86 assembly code?

- AddL
- ModB
- JumpEqual

(Continued on page 2.)
plainsub Normally, subproblems (started by a \deloppgave command) will be numbered “1a”, “1b”, etc. Using the plainsub option will result in just “a”, “b”, etc.

problem will call the individual questions (created using the \oppgave command; see Section 2.3.2.1 on page 9) for “Problems”; this is the default. (This option should only be used for English text.)

utsatt is used for deferred\(^4\) exams. This option may be used in combination with the del option already mentioned.

1.2 Exam information

Formal information about the exam is supplied by special commands,\(^5\) usually placed just before \begin{document}.\(^6\)

\dato{date} provides the exam date.

\emne{code}{name} specifies the course; the first parameter gives the code (as in “INF1000”) and the second one the full name.

\hjelpemidler{text} is used to provide information on which aids are allowed during the exam; the default is “Any”.

\tid{start time}{end time} give the time for the exam.

\vedlegg{text} tells which appendices are supplied with the exam text; the default is “None”.

If a name or a text is too long, you may add \\s to split the lines.

1.3 The problems

Each new problem should be started with an \oppgave{...}. The parameter should be a suitable problem title.

Exam writers are requested by the faculty to assign weights to the individual problems; this is easily accomplished using an option to \oppgave, as in

\oppgave[20\%]{Translation}

1.3.1 Subproblems

A problem may be split into several parts using the \deloppgave command. Parameter and option are as for \oppgave.

1.4 Useful declarations

1.4.1 List of problems

The command \tableofcontents will print a list of all the problems. This is requested by the faculty.

1.4.2 How many problems are there?

The command \Nproblems will tell how many problems there are in the set.

---

\(^4\)A deferred exam is an exam you take when you were ill during the standard exam.

\(^5\)The names of these commands reveal the Norwegian origin in this document class.
1.4.3 How many pages in the problem set?

The command \Npages returns the number of pages in the problem set.\textsuperscript{6}

1.4.4 Multiple choice lists

The environment \begin{choicelist}...\end{choicelist} is used for a list of alternatives from which the candidate shall make his or her selection. Each alternative is indicated by a \choice;\textsuperscript{7} for an example, see line 24 in Figure 2 on page 3.

Normally, the choices are labeled “a”, “b”, etc. If you want a different label (or no labels at all), just add an option to the \begin{choicelist}...\end{choicelist} environment (as has been done in Figure 2; see line 23).

\textsuperscript{6}The result from \Npages may be wrong if there is floating material (\begin{figure}...\end{figure} or \begin{table}...\end{table}) at the end of the document; try to avoid this.

\textsuperscript{7}For historical reasons, the command \item may also be used; it has exactly the same effect as \choice in this context.
2 Standard \LaTeX document class definitions

All \LaTeX class definitions consist of a standard part followed by code specific to that
class.

The class should also specify which version of \LaTeX it needs. Since \texttt{uioexam} uses the
\MakeLowercase command, it requires a version from June 1995 or more recent.

\begin{verbatim}
\NeedsTeXFormat{LaTeX2e}[1995/06/01]
\ProvidesClass{uioexam}[2015/06/01 v 3.12 UiO document class]
\end{verbatim}

Note that all internal names have the prefix “\texttt{exam@}” to avoid confusion with names in other
packages and any user-defined names.

2.1 Identification

All \LaTeX document classes should state their name and version number.

\begin{verbatim}
\ProvidesClass{uioexam}[2015/06/01 v 3.12 UiO document class]
\end{verbatim}

2.2 Initial code

This Section contains code that must be defined before the class options are processed.

\begin{verbatim}
\NeedsTeXFormat{LaTeX2e}[1995/06/01]
\ProvidesClass{uioexam}[2015/06/01 v 3.12 UiO document class]
\end{verbatim}

2.2.1 Adaption to various languages

This class presently handles the following four languages: American English (option
\texttt{USenglish} or \texttt{american}), British English (option \texttt{UKenglish} or just \texttt{english}), Norwegian
“Bokmål” (option \texttt{norsk}), and Norwegian “Nynorsk” (option \texttt{nynorsk}).

2.2.1.1 English text  The macro \texttt{\exam@english} defines\footnote{The individual word commands are defined using \texttt{\def} rather than \texttt{\newcommand} as they may be redefined. Using \texttt{\renewcommand} will not work either, as the commands are not defined the first time \texttt{\exam@english} is called. (I could have used a \texttt{\providecommand} followed by a \texttt{\renewcommand}, but that seems a little excessive.) the English words; they are
 identical for American and British English.

\begin{verbatim}
\newcommand{\exam@english}{
  \def{\exam@aidstext}{Permitted aids}
  \def{\exam@any}{Any}
  \def{\exam@candidate}{Candidate no}
  \def{\exam@caution}{Please make sure that your copy of the
    \exam@exercise set is complete before you attempt to answer anything}
  \def{\exam@consists}{This \exam@exercise set consists of}
  \def{\exam@contents}{\exam@Exercise s}
  \def{\exam@continued}{Continued on page}
  \def{\exam@day}{Day of examination}
  \def{\exam@encltext}{Appendices}
  \def{\exam@examin}{Exam in}
  \def{\exam@examinD}{Constituent exam in}
}\end{verbatim}
As is common in nearly all \LaTeX{} document classes, American English is the default language.

\textbf{2.2.1.2 Text in “Bokmål”} Here are the same words in Norwegian “Bokmål”.

\textbf{2.2.1.3 Text in “Nynorsk”} And, finally, here are the words in Norwegian “Nynorsk”. Most words are the same as for “Bokmål”.

2.3 Options

This part of the code defines the document class options.

\begin{itemize}
\item \textbf{Type size options}
\begin{itemize}
\item Exam problems should not be set in 10 pt type, but 11 pt and 12 pt are acceptable.
\end{itemize}
\item \textbf{Language options}
\begin{itemize}
\item As mentioned previously, the \texttt{uioexam} class can presently handle English (American and British) and Norwegian ("Bokmål" and "Nynorsk").
\end{itemize}
\end{itemize}

\end{document}
2.3.2.1 “Exercise” or “problem”? When writing English, some authors like to call the exam questions “problems” while others prefer “exercises”. The two options let the user decide.

\[\text{#4b}\] \{option declarations \#4(p.8)\} +\equiv
\DeclareOption{exercise}{
\def \exam@exercise {exercise}
\def \exam@Exercise {Exercise}}
\DeclareOption{problem}{
\def \exam@exercise {problem}
\def \exam@Exercise {Problem}}
(This code is extended in \#4e (p.9).)

The word “problem” is the default.

\[\text{#5a}\] \{option initiations \#5(p.8)\} +\equiv
\ExecuteOptions{problem}
(This code is extended in \#5b (p.9).)

2.3.3 Kinds of exams

In addition to ordinary exams, there are deferred, new and constituent ones. The choice is remembered as a letter code which will be used in accessing the correct text macros. The width of the information table is also increased when the title is changed.

\[\text{#4c}\] \{option declarations \#4(p.8)\} +\equiv
\DeclareOption{del}{\def \exam@del {D}\addtolength{\exam@width}{4mm}}
\DeclareOption{ny}{\def \exam@ny {N}\addtolength{\exam@width}{4mm}}
\DeclareOption{utsatt}{\def \exam@utsatt {U}\addtolength{\exam@width}{4mm}}
(This code is extended in \#4d (p.9).)

The default is to have an ordinary exam.

\[\text{#5b}\] \{option initiations \#5(p.8)\} +\equiv
\def \exam@del{}
\def \exam@ny{}
\def \exam@utsatt{}
\newlength{\exam@width} \setlength{\exam@width}{0cm}
(This code is extended in \#5c (p.10).)

2.3.4 Section number appearance

Should section numbers appear as “1b” or just “b”. The former is the default:

\[\text{#4d}\] \{option declarations \#4(p.8)\} +\equiv
\AtBeginDocument{\renewcommand{\thesubsection}{\arabic{section}\alph{subsection}}}
(This code is extended in \#4e (p.9).)

The option plainsub selects the latter alternative:

\[\text{#4e}\] \{option declarations \#4(p.8)\} +\equiv
\DeclareOption{plainsub}{\AtBeginDocument{\renewcommand{\thesubsection}{\alph{subsection}}}}
(This code is extended in \#4f (p.9).)

2.3.5 Additional options

If the problem set is to be handed in, it should contain a square for the student’s number.

\[\text{#4f}\] \{option declarations \#4(p.8)\} +\equiv
\DeclareOption{number}{\setboolean{exam@number}{true}}
(This code is extended in \#4g (p.10).)
The Boolean variable must be declared:

```latex
\newboolean{exam@number}
```

(This code is extended in #4_h (p.10).)

Any other option is sent to the article class.

```latex
\DeclareOption*{\PassOptionsToClass{\CurrentOption}{article}}
```

2.3.6 Option initiation

After all options have been defined, they may be processed.

```latex
\ProcessOptions \relax
```

2.4 Package and class loading

The `uioexam` class is built on top of a base document class and various packages.

```latex
\LoadClass[a4paper,\exam@size]{article}
```

(This code is used in #2_c (p.10).)

2.4.1 The calc package

When calculating page numbers, the `calc` package will be helpful.

```latex
\RequirePackage{calc}
```

(This code is extended in #6_a (p.15). It is used in #2_c (p.10).)

2.4.2 The ifthen package

Since the `uioexam` class does some testing, the `ifthen` package is useful.

```latex
\RequirePackage{ifthen}
```

2.4.3 The base document class

As mentioned, `uioexam` is an extension of the standard `article` document class. The option "a4paper" and the specified type size are standard.

```latex
\LoadClass[a4paper,\exam@size]{article}
```

(This code is used in #2_c (p.10).)

3 Code specific to uioexam

3.1 Page size and layout

The text area of exam papers should be somewhat taller than the standard A4 page layout. The width is not extended as that would impede readability.

```latex
\addtolength{\topmargin}{-1.7cm}
```
We can relax the rather strict limits that the standard \LaTeX\ document classes set when breaking paragraphs into lines.

\begin{verbatim}
\addtolength{\textdepth}{3cm}
(This code is extended in \#8a (p.11). It is used in \#1 (p.6).)
\end{verbatim}

3.2 Page styles

\texttt{uioexam} defines two new page styles:

\texttt{examfirst} is used for the front page. It contains the table with all the exam information.

\texttt{exammain} is used for all the other pages. It contains a header and — except for the final page — a footer.

\begin{verbatim}
\tolerance=6000 \hbadness=\tolerance \pretolerance=3000
(This code is extended in \#8b (p.11).)
\end{verbatim}

3.2.1 The macro \texttt{\exam@head}

This macro defines the header to use on every page but the first. In a slanted font, it gives the exam code and the date to the left and the page number to the right.

\begin{verbatim}
\newcommand{\ps@examfirst}{% \def@evenhead{\exam@info} \def@oddhead{\exam@info} \def@evenfoot{\exam@foot} \def@oddfoot{\exam@foot}}
\newcommand{\ps@exammain}{% \def@evenhead{\exam@head} \def@oddhead{\exam@head} \def@evenfoot{\exam@foot} \def@oddfoot{\exam@foot}}
\end{verbatim}

3.2.2 The macro \texttt{\exam@foot}

This macro defines the footer to use on every page. It gives, in a slanted font, a continuation message referring to the following page number. On the last page, however, the footer should be empty.\footnote{Try doing that automatically in FrameMaker or Word! 😊}

\begin{verbatim}
\newcommand{\ps@examhead}{% \exam@examin\ \exam@id, \exam@date \hfill \exam@page\ \thepage}}
\end{verbatim}

\footnote{Ideally, one should design a special page style for the last page and specify something like \texttt{\AtEndDocument{\thispagestyle{examlast}}}

This will not work, however, if there is little text on the last page; then \LaTeX\ will apply that page style to the last page but one. The reason for this behavior is that \LaTeX\ reads ahead before deciding where to break the page.

11
3.2.3 The macro \exam@info

This macro defines the page information table which is implemented as a page header used on the front page. It contains a centered box with no height and depth; the \LaTeX command \raisebox was used to achieve this effect.

3.2.3.1 Fonts used in the page information table  As mentioned in the introduction, the exam paper layout is based on preprinted sheets distributed in ancient times. I don’t recognize the font used there, but Computer Modern Sans at 14 pt looks sufficiently similar.

3.2.3.2 The candidate’s number  If the author has specified it, a box for the candidate’s number is added in the top right-hand corner.

The box should occupy no vertical space so as not to influence the placing of the other front page elements.
3.2.3.3 The name of the University and the Faculty First comes a centered line with the University’s name followed by another line with the name of the Faculty. These are in a bigger font than the other text in the exam information table.

\#12 \{\texttt{exam@info: name of university}\} ≡
\{\centering
\fontsize{25}{25pt}\bfseries \texttt{\exam@univ}\[4mm]
\fontsize{20.7}{20pt}\mdseries \texttt{\exam@faculty}
\par\}
\vspace{8mm}
(This code is used in \#9c, (p.12).)

3.2.3.4 The main exam information Now comes the table with the main information concerning the exam. The table has two columns, but the entry stating the number of pages spans both columns.

\#13 \{\texttt{exam@info: main information table}\} ≡
\{\texttt{exam@info: define time line \#14 (p.13)}\}
\{\renewcommand{\arraystretch}{1.6}%
\leavevmode\hspace*{-\exam@width}\begin{tabular}{@{}ll@{}}
\csname exam@examin\exam@del\exam@ny\exam@utsatt\endcsname:&
\exam@breakable{\exam@id~\exam@dash~\exam@title}\\[4mm]
\exam@day:& \exam@date \exam@timeline\multicolumn{2}{@{}l@{}}{\exam@consists\ Npages\ \exam@pages.}\\[4mm]
\exam@encltext:& \exam@breakable{\exam@encl}\\[4mm]
\exam@aidthext:& \exam@breakable{\exam@aids}\\[4mm]
\end{tabular}\hspace*{-\exam@width}}\par
\vspace{8mm}
(This code is used in \#9c, (p.12).)

(Note the redefinition of \arraystretch to increase vertical spacing.)

Note that some entries contain a small table with only one column. The reason for this is that the text can be quite long, and we want to handle \	extbackslash s gracefully.

\#8e \{\texttt{uiioexam definitions \#8 (p.10)}\} +\equiv
\newcommand{\texttt{\exam@breakable}}{[1]{%}
\renewcommand{\texttt{\arraystretch}}{1.1}%
\begin{tabular}{@{}l@{}}
#1
\end{tabular}}
(This code is extended in \#8f (p.14).)

The line with the exam times must be given special treatment as it may be omitted.\textsuperscript{12}

\#14 \{\texttt{exam@info: define time line}\} ≡
\ifthenelse{\equal{\texttt{\exam@timea}}{}}{%
{\def \texttt{\exam@timeline}{\}}}%
{\def \texttt{\exam@timeline}{\exam@hours:&
\exam@timea,\exam@timeline{\exam@timea,-\exam@timeb}}}\par
(This code is used in \#13 (p.13).)

3.2.3.5 A word of caution After the exam information table comes a mandatory caution to the students.

\#15 \{\texttt{exam@info: caution}\} ≡
\{\centering
\exam@caution.\}

\textsuperscript{11}I use the \texttt{\centering} command rather than the \texttt{\begin{center}...\end{center}} environment as the latter — for some reason I do not yet understand — produces a warning about a missing \texttt{\item}.

\textsuperscript{12}Note the trick of appending the macro \texttt{\exam@timeline} to the previous line; this is necessary as the the \TeX\ table parser will otherwise start a new line and run into trouble when there is none.
Since the front page header now occupies quite a lot of space, we must compensate at the document start.\(^{13}\)

\begin{verbatim}
\AtBeginDocument{\vspace*{7.5cm}}
\end{verbatim}

\((\text{This code is extended in } \#8_{f}(p.14).)\)

### 3.3 Section headings

The section headings look slightly different from the standard ones:\(^{14}\)

- The \texttt{section} heading starts with the word “Oppgave” (or “Oppgåve”, “Exercise” or “Problem”; see Section 2.2.1 on page 6).
- The \texttt{subsection} heading contains no such specification.

This is implemented by redefining the standard hook \texttt{@seccntformat} to include the \texttt{\exam@\texttt{name} and \exam@\texttt{space}}.\(^{15}\)

\begin{verbatim}
\renewcommand{\@seccntformat}{% \csname exam@\texttt{name}\endcsname\csname exam@\texttt{space}\endcsname \csname the\texttt{#1}\endcsname \hspace*{1em}}
\newcommand{\exam@sectionspace}{~}
\end{verbatim}

\((\text{This code is extended in } \#8_{g}(p.14).)\)

#### 3.3.1 A notation with weights

The exam problems should be weighted so the students will know which are the most important ones. To facilitate this, alternative\(^{16}\) versions of \texttt{section} and \texttt{subsection} are provided:

\texttt{\oppgave[w]{...}} is used to indicate that the next problem has the specified weight.

\texttt{\deloppgave[w]{...}} is used to indicate that the sub-problem has the given weight.

\begin{verbatim}
\newcommand{\oppgave}{[]}{{\ifthenelse{\equal{#1}{}}{\section{#2}}{\section{#2\hspace{0.8em}\mdseries (\exam@weight~#1)}}}}
\newcommand{\deloppgave}{[]}{}
\end{verbatim}

\(^{13}\)Why not drop the elaborate page style of the front page and let \texttt{\AtBeginDocument} generate the exam information table? Unfortunately, this is expressly forbidden in LaTeX:\(^{2}\text{Section 4.7}\)

> “The \texttt{\AtBeginDocument} hook should not be used for code that does any typesetting since the typeset result would be unpredictable.”\(^{[2, \text{Section 4.7}]\)}

However, just inserting vertical space seems to work OK.

\(^{14}\)I assume that levels below \texttt{subsection} are not used in an exam problem.

\(^{15}\)This redefinition works even when \texttt{\exam@\texttt{name} and \exam@\texttt{space}} are undefined because the \LaTeX\ specification states that

> … the “expansion of the entire \texttt{\csname...\endcsname} text will be a single control sequence token, defined to be like \texttt{\relax} if its meaning is currently undefined.”\(^{[1, \text{p 213}]\)}

\(^{16}\)I decided to keep the original versions of \texttt{section} and \texttt{subsection} unmodified, as some authors might want to employ some variants that are not supported by \texttt{\oppgave} and \texttt{\deloppgave}, like \texttt{\section*[...]} or \texttt{\section[short text]{...}}.

14
3.4 List of choices

When using multiple choice exams, a list of alternatives in which the candidate may tick off the answer, is useful. The choicelist environment is implemented as a specialization of list:

\newcommand{\choicelist}[1][]{\list{\addtocounter{\exam@choice}{1}\ding{111}\item}{\setcounter{\exam@choice}{0}\setlength{\itemsep}{0pt}\setlength{\parsep}{0pt}}}\\
(\textit{This code is extended in \#8 (p.15).})

(Note that each choice may be started with either \item or \choice.)

A suitable square for marking can be found in Zapf Dingbat:

\RequirePackage{pifont}\\
(\textit{This code is extended in \#6 (p.15).})

The choice counter must be defined:

\newcounter{\exam@choice}\\

3.5 Table of contents

The table of contents is typeset somewhat differently from the standard article style. For instance, there is no vertical space between the sections, and it is not necessary to test \secnumdepth. This code is copied from the \LaTeX\ source and slightly modified.

\renewcommand{\@section}[2]{%\addpenalty@secpenalty\vspace{0.0em} \setlength{\itemsep}{1.5em} \begingroup \renewcommand{\@pnumwidth}{5em} \parindent = \z@ \rightskip = \@pnumwidth \parfillskip = -\@pnumwidth \leavevmode \bfseries \advance\leftskip\@tempdim\hfil
\nobreak\hb@xt@\@pnumwidth{\hss \normalfont \MakeLowercase{\exam@page} #2}\par \endgroup }\\
(\textit{This code is extended in \#6 (p.16).})
3.5.1 Modifications to \tableofcontents

As this command now produces a list of problems, the title should be different.

\AtBeginDocument{\def \contentsname{\exam@contents}}\setcounter{tocdepth}{1}
(This code is extended in \#8i(p.16).)

3.6 User interface

The user interface consists of five commands giving the required exam info:

\dated gives the exam date.

\emnetells the subject. It has two parameters: the former tells the code (i.e., “IN 142”) and the latter the full title of the course (i.e., “Operativsystemer”).

\hjelpemidler names the permitted aids (if any).

\tidgives the exam hours. It has two parameters: the time the examination starts, and when it ends. Specify “\tid{}{}” if you want to omit this information.

\vedlegglists any additional material (if there is any).

(The command names are in Norwegian and mean “date”, “subject”, “aids”, “time”, and “appendices”, respectively.)

For example, the problem set shown in Figure 1 on page 2 used the following commands to generate the required exam information:

\dated{17.-oktober 2008} \emnet{INF2100}{Programmeringslaboratorium\ med kompilatorkonstruksjon} \tid{9.00}{12.00}

All the commands just save their data in a macro for later user; see Section 3.2.3 on page 12.

\AtBeginDocument{\def \examdate{#1}\def \examid{#1}\def \examtitle{#2}}\def \exam@date{#1}\def \exam@id{#1}\def \exam@title{#2}\def \exam@aids{#1}\def \exam@timea{#1}\def \exam@timeb{#2}\def \exam@encl{#1}
(This code is extended in \#8m(p.16).)

The default values for two commands are just a lot a question marks that the user is bound to notice.

\dated{??.. ??.. ???}\emnet{IN ??..{??..}}
(This code is extended in \#8m(p.16).)

The other three commands, however, have sensible defaults.

\hjelpemidler{\exam@any}\tid{}{}\vedlegg{\exam@none}
(This code is extended in \#8n(p.17).)

3.7 Additional definitions

The uioexam package defines a few new commands that are useful when writing exam questions.
3.7.1 How many problems are there?

We can use the cross reference mechanism of \LaTeX to determine how many problems there are in the set. First, we add a label at the end of the document:\footnote{This method of identifying the final page is not without flaws. If the exam set has floating figures or tables, they may produce pages after the labeled page. I see no easy way around this problem; fortunately, however, it does not occur very frequently.}

\begin{verbatim}
\begin{numberedblock}{\&A} \&O \&E
  \AtEndDocument{\label{::SLUTT::}}
  \newcommand{\Nproblems}{\exam@get@number{\exam@ref{::SLUTT::}}}
  \newcommand{\Npages}{\exam@pageref{::SLUTT::}}
\end{numberedblock}
\end{verbatim}

Then, we can use a special version of \ref to find the last section number:

\begin{verbatim}
\begin{numberedblock}{\&B} \&P \&R\&Q
  \newcommand{\exam@get@number}{\setcounter{exam@temp}{0}
  \setbox0=\hbox{\global\advance\c@exam@temp#1}
  \arabic{exam@temp}}
\end{numberedblock}
\end{verbatim}

3.7.1.1 A variant of \ref The standard \ref command produces a combination of tokens and typesetting commands rather than just tokens. Since we want to use these tokens, we need a token-producing version of \ref for internal use. It is called \exam@ref.

\begin{verbatim}
\begin{numberedblock}{\&C} \&P \&R\&Q
  \newcommand{\exam@ref}{\@ifundefined{r@#1}{0}
  {\expandafter\expandafter\expandafter @cdr\csname r@#1\endcsname
  \@nil}}
\end{numberedblock}
\end{verbatim}

Note that \exam@ref will return "0" if the label has not been defined; no warning will be given.

3.7.2 How many pages are there?

Using the same technique as described above, we can easily find how many pages there are in the problem set:

\begin{verbatim}
\begin{numberedblock}{\&D} \&E
  \newcommand{\Npages}{\exam@pageref{::SLUTT::}}
\end{numberedblock}
\end{verbatim}

3.7.2.1 A variant of \pageref This token-producing version of \pageref is similar to \exam@ref above.

\begin{verbatim}
\begin{numberedblock}{\&E} \&F
  \newcommand{\exam@pageref}{\@ifundefined{r@#1}{0}
  {\expandafter\expandafter\expandafter @cdr\csname r@#1\endcsname
  \@nil}}
\end{numberedblock}
\end{verbatim}
3.7.3 Additional commands

To typeset a European dash of \(\frac{3}{4}\)em length without loading the textcomp\textsuperscript{18} package, this command might be used:

\[
\texttt{\textbackslash newcommand\{\texttt{\textbackslash exam@dash}\}\{\texttt{\textbackslash mbox\{-\hspace*{-0.25em}\texttt{-}\}}\}}
\]

\textsuperscript{18}The reason we don’t want to load packages unnecessarily, is that the user might want to load them with different options.
References


[2] \texttt{\LaTeX2e} for class and package writers. Included in the \LaTeX distribution. 1995.
Meta symbols

\{\texttt{\textbackslash exam\textbackslash info: caution} \#15\} ................................................................. page 13
\{\texttt{\textbackslash exam\textbackslash info: define time line} \#14\} ................................................................. page 13
\{\texttt{\textbackslash exam\textbackslash info: main information table} \#13\} ................................................................. page 13
\{\texttt{\textbackslash exam\textbackslash info: name of university} \#12\} ................................................................. page 13
\{\texttt{\textbackslash exam\textbackslash info: print number box} \#11\} ................................................................. page 12
\{\texttt{\textbackslash exam\textbackslash info: select font} \#10\} ................................................................. page 12
\{\texttt{\textbackslash define page styles} \#9\} ................................................................. page 11
\{\texttt{\textbackslash initial code} \#3\} ................................................................. page 6
\{\texttt{\textbackslash load base document class} \#7\} ................................................................. page 10
\{\texttt{\textbackslash load packages} \#6\} ................................................................. page 10
\{\texttt{\textbackslash option declarations} \#4\} ................................................................. page 8
\{\texttt{\textbackslash option initiations} \#5\} ................................................................. page 8
\{\texttt{\textbackslash standard \LaTeX\ specifications} \#2\} ................................................................. page 6
\{\texttt{\textbackslash uioexam} \#1\} ................................................................. page 6 *
\{\texttt{\textbackslash uioexam definitions} \#8\} ................................................................. page 10
(Symbols marked with * are not used.)