The \texttt{uwaexam} class

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Version 0.99b, 1999/10/13

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1 Introduction

The file \texttt{uwaexam.dtx} is the master file for the \LaTeX\ class, \texttt{uwaexam}, which provides a class for exam preparation at The University of Western Australia, with defaults suitable for \LaTeX\ users in the Department of Mathematics & Statistics Australia. It is built on the standard \LaTeX\ \texttt{article} class with option \texttt{a4paper}.

2 Implementation

The usual name, date, and version information:

\begin{verbatim}
1 \typeout{uwaexam 0.99b}
2 \NeedsTeXFormat{LaTeX2e}
3 \ProvidesClass{uwaexam}[1999/10/13 v0.99b]
\end{verbatim}

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2.1 Options

We build the class `uwaexam` on top of \LaTeX's `article` class with options `a4paper`, `12pt`, and `oneside`; but we prefer to use a little more of the page.

Additional to the options inherited from the `article` class, we also provide the following options:

- **library**: Essentially makes the left margin 1 cm larger and the right margin 1 cm smaller, so that The University of Western Australia's library has the 4 cm left margin it requires for binding. By default, the text is centred on each page with 3 cm side margins.

- **mixedcasehdrs**: Sets the case of headers on the title page to be mixed case (or as typed by the user). By default, most headers are in uppercase.

- **cnameinrhead**: Not yet implemented. It will include the (abbreviated) course name in the running head. By default, only the department, and course code information appear in the running head.

```latex
\DeclareOption*{\PassOptionsToClass{\CurrentOption}{article}}
\newif\if@library
\DeclareOption{library}{\@librarytrue}\newif\if@mixedcasehdrs
\DeclareOption{mixedcasehdrs}{\@mixedcasehdrstrue}\newif\if@cnameinrhead
\DeclareOption{cnameinrhead}{\@cnameinrheadtrue}
\ProcessOptions\relax
\LoadClass[a4paper,12pt,oneside]{article}
```

2.2 Page parameters

The `\calclayout` command determines the value of `\textheight`, `\topmargin` and `\oddsidemargin`, from the values of `\paperheight`, `\textheight`, `\textbodyheight`, `\textwidth`, `\headheight`, `\headsep`, `\footskip` and `\textwidth`. It is loosely based on a command from the `amsbook` class. When the `library` option is selected the text is shifted right 1 cm so that the left margin is The University of Western Australia library's required 4 cm (so long as the user has not changed the setting of `\textwidth` below).

```latex
\def\calclayout{\global\textheight\textbodyheight
\global\advance\textheight -\headheight
\global\advance\textheight -\headsep
\global\advance\textheight -\footskip
\global\oddsidemargin\paperwidth
\global\advance\oddsidemargin -\textwidth
\global\divide\oddsidemargin\tw@ \global\advance\oddsidemargin -1truein
\global\divide\oddsidemargin\tw@ \global\advance\oddsidemargin -1truein
\global\oddsidemargin\paperwidth
\global\advance\oddsidemargin -\textwidth
\global\divide\oddsidemargin\tw@ \global\advance\oddsidemargin -1truein\relax
\global\divide\oddsidemargin\tw@ \global\advance\oddsidemargin -1truein
\if@library \global\addtolength{\evensidemargin}{-1cm}\fi}
```

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Now we set the page parameters. We introduce a new dimensional parameter \textbodyheight which is the sum of \headheight, \headsep, \textheight and \footskip, i.e. \textbodyheight is \pageheight minus the top and bottom margins. We set \headsep to zero so that any continuations appearing at the top of the page (which are set in the page header) appear immediately above the page text. The parameter \headheight is initially set to 4 \baselineskip and increased by 1 \baselineskip, by the \maketitle command for each additional \coursenum over two. We make no change to the \article class’s setting of \footskip. We set \textbodyheight to be 4 cm less than \paperheight and \texwidth to be 6 cm less than \paperwidth. With these settings the \calclayout command centres the text so that the top and bottom margins are each 2 cm and the left and right margin are each 3 cm, except when the library option is applied in which case, the left margin is increased by 1 cm and the right margin is decreased by 1 cm. In this way, we comply with the wishes of The University of Western Australia library which specifies that the margin near the binding must be at least 4 cm and other margins at least 2 cm, and the pagebreaks occur in the same place when the option library is not selected. The setting of \evensidemargin (the left margin on even-numbered pages) is ignored unless the user chooses the twoside option. We do a \calclayout after setting the parameters, just in case the user for whatever reason fails to use the \maketitle command. It is not expected that the user will need to change the page parameters in any way, but if she must the only safe ones to adjust are \textbodyheight and \texwidth, and perhaps \headsep and \footskip. One changes \paperheight and \textheight ordinarily by choosing a \documentclass option e.g. letterpaper (the default is a4paper).

\newdimen\textbodyheight \textbodyheight\paperheight
\addtolength{\textbodyheight}{-4cm}
\setlength{\textwidth}{\paperwidth}
\addtolength{\textwidth}{-6cm}
\normalsize
\setlength{\headheight}{4\baselineskip}
\setlength{\headsep}{0pt}
\calclayout
\setlength{\marginparsep}{4mm}
\setlength{\marginparwidth}{12mm}

2.3 Packages automatically loaded

We load the xspace package, so that the the variables \totalmks, \numquestions and \numpages which we define later can be used without having to remember to include a trailing explicit space.

\RequirePackage{xspace}

We ensure that the pslatex package is loaded, so that Times fonts are used.

\RequirePackage{pslatex}

We ensure that the AMSTeX packages amsmath [1] and amsfonts are loaded. You get still more if you use the uwamaths package [3].

\RequirePackage{amsmath}\relax
The following _AMSTeX_ command tells _LaTeX_ to allow breaks within maths displays but to avoid them as much as possible.

\allowdisplaybreaks[1]

To get nice page headers we use the `fancyhdr` package.

\RequirePackage{fancyhdr}
\renewcommand{\headrulewidth}{0pt}
\def\@UX@rightmark{\@xp\@rightmark\topmark{}{}}
\lhead{\ \}
\bfseries\@title\ 
\bfseries\@date
\normalfont\@lheadxtra
\rightmark
\chead{}
\def\@set@course@in@rhead#1#2#3#4{\\bfseries#1 #3 : #2.#4}
\rhead{\thepage.\\@course@in@rhead
\ifcase\@ncoursenums\\\\or\\fi\\\\}
\cfoot{\leftmark}
pagestyle{fancy}
fancypagestyle{firstpage}{%
\addtolength{\topmargin}{\baselineskip}
\addtolength{\topmargin}{-\@ncoursenums\baselineskip}
}\else
\addtolength{\topmargin}{-\baselineskip}
\fi
\fancyhf{} \fancyfoot[C]{\leftmark}}

2.4 Titlepage and headline commands

Now we set up macros for the titlepage and headlines. Firstly, we provide \texttt{\institution}, \texttt{\deptandcode}, \texttt{\coursenum}, which define the \texttt{institution} (by default: \textit{The University of Western Australia}), the \texttt{department} and \texttt{department numerical code} (by default: \textit{Mathematics} and \texttt{539}), and the \texttt{course number} (which has two arguments, one of which is optional). The optional argument for \texttt{\coursenum} is used for specifying a course’s abbreviated \texttt{name}, if there is one; and the main argument is the course’s 3-digit number, e.g. suppose the course was known as \textit{Mathematics 1CS} and had full numerical code \texttt{539.170}, one would specify this with:

\texttt{\coursenum[1CS]{170}}

If on the other hand, the course does not have an abbreviated name, (in the above example, the course is known as simply: \textit{Mathematics 170}) one just omits the optional argument:

\texttt{\coursenum{170}}
2. IMPLEMENTATION

(which is exactly equivalent to typing:  \coursenum\{170\}\{170\}). To also include the full course name in the title we provide  \course, which when used is used in lieu of  \coursenum. It is similar to  \coursenum except that it has an additional mandatory argument (which is the full course name). For example, the course Mathematics 3P7 : Rings and Number Theory, which has full numerical code 539.337, is specified by:

\course\{3P7\}\{337\}\{Rings and Number Theory\}

Ordinarily, of these, the user will only need to use  \coursenum or  \course, and occasionally  \deptandcode. If a course has more than one number,  \coursenum or  \course may be used several times; each time, using the  department and  code values from the most recent  \deptandcode command, i.e. for a course with numbers in two different departments, say, the second  \coursenum command should be preceded by an appropriate  \deptandcode command.

Now we provide the command  \duration, which is the time-length of the exam, and by default we set to:  Three hours. (The reason we chose not to call the
command \time is that \time is already a \TeX command!)
99 \newcommand*{\duration}[1]{\def\@duration{#1}}
100 \duration{Three hours}

Now we define defaults for \title which is used to define the type of examinations being held, and the \date.
101 \title{\ifnum\month<7 First Semester Examinations\%
102 \else Annual Examination\%
103 \fi}
104 \date{\ifnum\month<7 June \else November \fi \the\year}

We don’t set the \author of an exam in the paper itself … but we retain it and type it out when the document is typeset. Since the \author is not set at the beginning of the paper, this also removes \TeX’s usual warning if \author is absent.
105 \def\author#1{\typeout{Paper prepared by #1.}}

Now we provide the environments instructions (which is just a doublespaced center environment) and extrainstructions (which is set to the full width, \oneandhalfspaced and in italics). The former environment is intended for conveying simple information regarding the number of questions, their values and how many questions should be attempted. The latter environment is intended to be used for more technical information.
106 \newbox\instructionsbox
107 \newenvironment{instructions}%
108 \{\iftex\maketitle\relax
109 \ClassWarning{uwaexam}
110 \{instructions should precede \protect\maketitle\%
111 \fi
112 \global\setbox\instructionsbox=\vtop \bgroup
113 \center\normalfont\doublespacing\normalsize}
114 \endcenter\hrulefill\egroup \vskip\@outerparskip
115 \ifx\@setinstructions\relax \@setinstructionsa \fi
116 \def\@setinstructions\{\@setinstructionsa
117 \ifvoid\instructionsbox
118 \else \skip@20\p@ \advance\skip@-\lastskip
119 \advance\skip@-\baselineskip \vskip\@outerparskip
120 \box\instructionsbox
121 \prevdepth\z@ % because \instructionsbox is a vtop
122 \fi
123 \fi
124 \fi
125 \newbox\extrainstructionsbox
126 \newenvironment{extrainstructions}%
127 \{\iftex\maketitle\relax
128 \ClassWarning{uwaexam}
129 \{extrainstructions should precede \protect\maketitle\%
130 \fi
131 \global\setbox\extrainstructionsbox=\vtop \bgroup
132 \itshape\normalfont\normalsize\noindent\ignorespaces}
Now we define the \maketitle command to set these on the first page of the exam.

\renewcommand{\maketitle}{\par
\calclayout
\begingroup
\renewcommand{\fnsymbol}\c{\footnote}
\def{\makefntext}{\parindent 1em\noindent \hb@xt@1.8em{\hss \@textsuperscript{\normalfont \@thefnmark}}\#1\parindent 0em\noindent}
\@maketitle
\endgroup
\setcounter{footnote}\{0\}
\global\let\thanks\relax
\global\let\maketitle\relax
\global\let\@maketitle\relax
\global\let\@thanks\@empty
\global\let\title\relax
\global\let\author\relax
\global\let\and\relax}
\if@mixedcasehdrs
\def{\SetCase}{\MakeUppercase}
\else
\let\SetCase\MakeUppercase
\fi
\def{\@set@course@in@title}{\vspace*{0pt} \vspace*{0pt} \hfill \SetCase{\#1 \ #3} \hfill \llap{\#2. \#4}}
\def{\@set@coursename@in@title}{\vspace*{0pt} \hfill \SetCase{\#1} \hfill \llap{\hphantom{777.777}}}
\def{\@maketitle}{\cleardoublepage \thispagestyle{firstpage}\par
\calclayout
\begingroup
\renewcommand{\fnsymbol}\c{\footnote}
\def{\makefntext}{\parindent 1em\noindent \hb@xt@1.8em{\hss \@textsuperscript{\normalfont \@thefnmark}}\#1\parindent 0em\noindent}
\@maketitle
\endgroup
\setcounter{footnote}\{0\}
\global\let\thanks\relax
\global\let\maketitle\relax
\global\let\@maketitle\relax
\global\let\@thanks\@empty
\global\let\title\relax
\global\let\author\relax
\global\let\and\relax}
2.5 Sectioning commands

Now we modify the \section command to typeset headers such as: PART A. We do not use \part here, since \part was used for subquestions in the plain \TeX exam.tex previously. It is assumed that a new \section will not occur in the middle of a question, and so an \enditem is issued. The \sectionmark command is also disabled. The other sectioning commands of the article class are disabled, including \part which was used for subquestions in the plain \TeX exam.tex previously. They issue a warning message if used.

\newdimen\linespacing
\setlength{\linespacing}{\baselineskip}
\newdimen\normalparindent
\setlength{\normalparindent}{18pt}
\def\sectionname{PART}
\renewcommand{\thesection}{\sectionname \@Alph\c@section}
\def\@UXsection{
\enditem
\@startsection{section}{1}{}{-\@totalleftmargin}{.7\linespacing\@plus\linespacing}{.5\linespacing}{}
\renewcommand{\sectionmark}[1]{}
\renewcommand{\sectionmark}{\@Alph\c@section}
2. IMPLEMENTATION

2.6 Exam question qenum environment

We provide a qenum environment (question enumerate) which is based on \LaTeX's enumerate environment. By nesting qenum environments, one gets parts and subparts of questions.

We need to modify \LaTeX's \texttt{\item} command within qenum; in particular, we use the optional argument for \textit{marks}. In order that \texttt{\item} will work as usual for other list and trivlist environments, we first save \LaTeX's definition of \texttt{\item} as \texttt{\normalitem} and redefine \texttt{\list} and \texttt{\trivlist} to first restore \texttt{\item} as \texttt{\normalitem}. Since \texttt{\part} was used for subquestions, and \texttt{\partpart} was used for subsubquestions in the plain \TeX\ \texttt{exam.tex} previously, inside the qenum environment each is \texttt{\let} to \texttt{\item}.

```latex
\let\normalitem\item
\let\normallist\list
\let\normaltrivlist\trivlist
\def\list{\let\item\normalitem \normallist}
\def\trivlist{\let\item\normalitem \normaltrivlist}
```

We define counters for each level of nesting.

```latex
\newcount\@qenumdepth \@qenumdepth=0
\@definecounter{qenummks} \setcounter{qenummks}{0}
\@definecounter{qenumi} \@definecounter{qenummksi}
\@definecounter{qenumii} \@definecounter{qenummksii}
\@definecounter{qenumiii} \@definecounter{qenummksiii}
\@definecounter{qenumiv} \@definecounter{qenummksiv}
```

The qenum environment uses these counters to create labels.

```latex
\@xp\list\csname label\@qenumctr \endcsname
{\usecounter\@qenumctr%
 \let\item\q@item%
 \let\part\item \let\partpart\item%
 \setcounter{\@qenummksctr}{0}%
 \def\makelabel##1{\hss\llap{##1}}%
 \fi}
```

The qenum environment also handles the optional marks argument.

```latex
\def\endqenum{\addtocounter{\@qenummksctr}{}
\csname the\@qenummksctr\endcsname%
```

```latex
\typeout{Total marks
\ifnum \@qenumdepth >1
  \csname p@\@prev@qenumctr\endcsname=%
  \csname the\@prev@qenumctr\endcsname:
\else on paper:
  \fi
\arabic{\@prev@qenummksctr}.
\ifnum \@qenumdepth =1
\penalty\@M \addvspace\itemsep
\hrulefill\[-3ex]
\vspace*{0pt}\hrulefill\par
\label{q:\@last}
\protected@write\@auxout{}
{\string\newlabel{@total@mks}{{\arabic{qenummks}}{}}}
\markboth{}{}
\fi
\endlist
\renewcommand\theqenumi{\@arabic\c@qenumi}
\renewcommand\theqenumii{\@alph\c@qenumii}
\renewcommand\theqenumiii{\@roman\c@qenumiii}
\renewcommand\theqenumiv{\@Alph\c@qenumiv}
\newcommand\labelqenumi{\theqenumi.}
\newcommand\labelqenumii{\theqenumii}
\newcommand\labelqenumiii{\theqenumiii}
\newcommand\labelqenumiv{\theqenumiv}
\let\endqitem\relax
\def\q@item{\@inmatherr\item
\endqitem\@ifnextchar[\@q@item{\@noitemargtrue \@q@item[]}}
\def\@endqitem{\let\endqitem\relax\ifnum \@qenumdepth =1
\markboth{SEE OVER}{\ }
\else
\markboth{QUESTION
\csname p@\@prev@qenumctr\endcsname=%
\csname the\@prev@qenumctr\endcsname\CONTINUES OVER THE PAGE}
{\csname p@\@prev@qenumctr\endcsname%}

Here follows \q@item our replacement for \item. Essentially, we disable the optional argument, and warn the user if they attempt to use it, add an \hrulefill when the qenum depth is at the top level and spit out \LaTeX \markboth commands at appropriate points (the bottommost \markboth command on a page is set in the \footline.
Now we create the \mks command that typesets the marks allocated to a question or part of a question. Also, the command \totalmks, defined in the next section, gives the total marks allocated for the paper; this can be used in the instructions environment, for example.

\def\mks#1{\ifnum #1=1\relax\def\@s{s}\else\def\@s{\ }\fi% 
\hphantom{[#1 mark\@s]}% 
\addtocounter{\@qenummksctr}{#1}% 
typeout{Marks for \csname p\@qenumctr\endcsname:% \csname the\@qenumctr\endcsname\} \Continued{})% 
\hbox{}% 

2.7 Mark, page and question accounting commands

For convenience we define:

\totalmks The total marks allocated on the paper.

\numpages The number of pages used by the paper.

\numquestions The number of questions on the paper.

The first of these will commonly be used in the instructions environment. The latter two are automatically set in the titlepage, and so are not expected to be used very very often.

\let\normalpagebreak\pagebreak

2.8 Pagebreaking enhancements

We redefine \pagebreak and \newpage to look ahead. If they are followed by an \item or a \section then issue an \enditem first. The command \enditem does any business required between \items of a qenum environment.
2.9 Spacing commands
We make available some spacing macros. The amounts of stretch are those specified for 12 pt by the \LaTeX Companion [4]. Other font sizes differ from these only marginally. See the \texttt{uwamaths} package [3] where the same macros are defined, for further discussion of these macros.

\begin{Verbatim}
\newcommand{\singlespacing}{\renewcommand{\baselinestretch}{1}}\end{Verbatim}
\begin{Verbatim}
\newcommand{\oneandhalfspacing}{\renewcommand{\baselinestretch}{1.24}}\end{Verbatim}
\begin{Verbatim}
\newcommand{\doublespacing}{\renewcommand{\baselinestretch}{1.66}}\end{Verbatim}

We set the normal spacing at \texttt{\oneandhalfspacing}, to make for easy reading.

That's it.

\endinput

3 A sample exam
Well that's it for the code. What follows is a typical example in \texttt{slanted typewriter text}, interspersed with comments and snapshots of what it will look like when typeset. Some lines are preceded by \%, meaning the line is commented out; if these lines are uncommented the effect will be the same (or in the case of \texttt{\date} and \texttt{\title}, similar); usually, you will not need these lines at all, they are included so users can see how to change some values from their defaults.

Usually one will open the exam with the following sequence

\begin{Verbatim}
\documentclass{uwaexam}
\usepackage{uwamaths}
\begin{document}
\end{Verbatim}

though using the \texttt{uwamaths} package is not essential. If the exam is destined for binding then one should use the \texttt{library} option i.e. the \texttt{\documentclass} line should read: \texttt{\documentclass[library]{uwaexam}}

By default, the title page headers are all in uppercase, as is our example; to vary this, so that mixed case is used, include the option \texttt{mixedcasehdrs} in the \texttt{\documentclass} declaration.

Next, if needed, come \texttt{\institution}, \texttt{\title} and \texttt{\date}. Normally none of these is necessary ... but occasionally, (e.g. setting a Mid-semester exam) it will be necessary to specify \texttt{\title} and \texttt{\date}. The values of \texttt{\title} and \texttt{\date} are automatically determined to be \textit{First Semester Examinations} and
June YEAR, respectively, during the first six months of the year, and Annual Examination and November YEAR, respectively, during the last six months of the year, where YEAR is whatever the current year is.

\%\institution{The University of Western Australia}
%\title{First Semester Examinations}
%\date{June 1999}

Then one specifies the course number(s) for the exam. The following lines specify that the exam is for the course Mathematics 1CS with number 539.170. (Of course, substitute the appropriate value for 170.) Normally, one need not specify \deptandcode.

%\deptandcode{Mathematics}{539}
\coursenum[1CS]{170}

The first argument of \coursenum is its abbreviated name, e.g. 1CS (might abbreviate 1st Year Calculus and Statistics, and it’s optional, since many courses are simply known by their number. So: \coursenum{170} would have specified course Mathematics 170 with number 539.170.

A course may have several numbers, and those numbers may be in different departments. Let’s, for argument’s sake suppose that the above course is also known as Agriculture 175 (with number 704.175). We would specify this by:

\deptandcode{Agriculture}{704}
\coursenum{175}

Now, if different, from Three hours we need to specify the \duration:

%\duration{Three hours}

Next comes the instructions environment. Here is an example that also demonstrates how one can use the \totalmks command.

\begin{instructions}
All questions may be attempted. Each question is worth 10 marks.

There is a total of \totalmks marks available.
\end{instructions}

Now issue a \maketitle:

\maketitle

This sets all the data following \begin{document} that we have seen so far, in the top of the first page, which should look something like what’s enclosed in
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the following box:

<table>
<thead>
<tr>
<th>The University of Western Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRST SEMESTER EXAMINATIONS</td>
</tr>
<tr>
<td>JUNE 1999</td>
</tr>
<tr>
<td><strong>MATHEMATICS 1CS</strong></td>
</tr>
<tr>
<td>539.170</td>
</tr>
<tr>
<td><strong>AGRICULTURE 175</strong></td>
</tr>
<tr>
<td>704.175</td>
</tr>
</tbody>
</table>

This paper contains:

? pages.

? questions.

Time allowed: THREE HOURS

All questions may be attempted.

There is a total of ? marks available.

An abbreviation of the above is also set in the page headers of subsequent pages. The question marks ? appearing in 3 places above (against the number of pages, number of questions and for \totalmks) occur because each uses a \label and so won’t be filled in until a second \text pass. (These \labels are intended to be internal. If you must know, the number of pages and the number of questions are \pageref{q:@last} and \ref{q:@last}, respectively; and \totalmks is \ref{@total@mks}. Essentially, if you avoid using @ in your \labels you will be safe.)

Now for the exam proper. The essential ingredients are the qenum environment which works like enumerate (qenum may also be nested to four levels like enumerate), and the command \mks which sets the marks awarded to a question or part of a question. Usually the right place to put \mks is at the end of the text of an \item. The example below demonstrates the use of qenum and \mks (the result is on the left and the code to get that result appears on the
1. $x_1, x_2, \ldots, x_n$ are given by
\[
\bar{x} = \frac{1}{n} \sum_{i=1}^{n} x_i \quad \text{and} \quad s_x^2 = \frac{1}{(n-1)} \sum_{i=1}^{n} (x_i - \bar{x})^2
\]
respectively.
If a linear transformation $u_i = ax_i + b$, $i = 1, 2, \ldots, n$, is made of the data, show that
\begin{enumerate}[(a)]
\item $\bar{u} = a\bar{x} + b$ and [1 mark]
\item $s_u^2 = a^2 s_x^2$. [2 marks]
\item If $s_x^2 = 9$ and $a = -4$, calculate the standard deviation of the $u_i$s. [1 mark]
\end{enumerate}

2. (a) Define the following concepts:
\begin{enumerate}[(i)]
\item The \textbf{sample space} $S$ of an experiment;
\item An \textbf{event};
\item A \textbf{random variable} on $S$. [4 marks]
\end{enumerate}

(b) A rare disease $D$ has an incidence of 0.1\%. If a person has $D$ then a diagnostic test signals that fact with probability 0.99 (the sensitivity). However on a disease free person, the test indicates absence of the disease with probability 0.98 (the specificity).
\begin{enumerate}[(i)]
\item A person is selected at random and tested. What is the probability that the test result is positive? [2 marks]
\item A person tests positive. Find the probability that he/she actually has $D$. [4 marks]
\end{enumerate}
There are a number of features that the above demonstration of the qenum environment does not show: it does not show the echoing and automatic totalling of marks that is logged when one \texttt{LATEXs} the document, nor does it show what appears in the page headers and footlines.

Finally, as usual, the \texttt{LATEX} file should be terminated with a

```
\end{document}
```

### 4 How to deal with bad pagebreaks

The standard \texttt{LATEX} way to force a pagebreak is to insert either a \texttt{pagebreak} or a \texttt{newpage}. These have been slightly modified to do some extra work when followed by an \texttt{item} or a \texttt{section} to do what you expect.

What if the \texttt{item} coming after a \texttt{pagebreak} or \texttt{newpage} is somehow hidden? e.g. the \texttt{item} is in a file that is \texttt{input} or \texttt{included}. In such cases, one needs to explicitly tell \texttt{LATEX} that the previous \texttt{item} is finished by issuing an \texttt{endqitem} before the \texttt{pagebreak} or \texttt{newpage}, as in the following example:

```
\endqitem
\pagebreak
\input{FileContainingNextItem}
```

Very occasionally, one might get a bad page break at or near the end of a question, e.g. the horizontal rule separator may end up on the top of a page or after just one or two lines of text immediately after continuation information. In order to help \texttt{LATEX} find a better pagebreak do the following: position a line

```
enlargethispage*{2\baselineskip}
```

(replace 2 with something larger, if you need it) a little before the intended position of the pagebreak, and then

```
\pagebreak
```

at the point where you would like the pagebreak to occur, which for the example mooted above, would be immediately before an \texttt{item}.

### 5 Embedding exam solutions and selection from a question pool

The \texttt{uwamaths} package \cite{uwamaths} provides \texttt{exquestion}, \texttt{solution} and \texttt{answer} environments, so that one can embed the solutions to questions in the same file as the exam. Putting a \texttt{nosolntrue} in the preamble of the document causes all the \texttt{solution} environments to be treated as comments, i.e. in this way, by commenting or not commenting out the \texttt{nosolntrue} one can produce a marker’s copy and a student’s copy of an exam, using the same file.

There is also an \texttt{exitem} environment which behaves like labelled \texttt{items}: the idea is that one can create a pool of questions and with a selector command (\texttt{exlist}) one can select the \texttt{exitem}’s one wants (the remainder, not selected, are treated as comments). With the \texttt{exitem} environment, one can build up a file with a large pool of questions over a number of years, and then simply by
modifying the list of labels given to \texttt{\textbackslash exlist} produce different exams. If any of the above has piqued your interest check out the section on \textit{Exercise question and answer environments} in [3].

Bibliography


[8] The \LaTeX\3 Project, \textit{\LaTeX\2e for class and package writers} (Jun. 1996). Filename: \texttt{clsguide.dvi}.

Index

Numbers written in italic refer to the page where the corresponding entry is described, the ones underlined to the code line of the definition, the rest to the code lines where the entry is used.

\begin{tabular}{lll}
\textbf{Symbols} & \textbf{A} & \\
\textbackslash & 46, 47, 50, 53, & a4paper \\
\& 56, 83, 173, 174, & a4paper option & 1–3 \\
\& 177, 196, 197, 265 & \textbackslash addpenalty 319, 323 \\
12pt & \textbackslash addtocounter & \textbackslash allowdisplaybreaks 42 \\
12pt option & \textbackslash addtolength & \\
& 254, 346, 368 & \texttt{amsbook} \\
& 24, 25, 28, 30, & \texttt{amsbook class} 2 \\
& 61, 62, 64, 82, 96 & \texttt{amsfonts} \\
\textbackslash & \texttt{amsfonts package} 3 \\
\textbackslash & \texttt{amsldoc.dvi} 18 \\
46, 50, 56, 83, 174, & \texttt{addvspace} 264, & \\
214, 294, 298, & 306, 320, 321, 323 & \\
301, 361, 364, 367 & \texttt{advance} & \\
& \texttt{amsldoc.dvi} 18 & \\
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Change History

v0.9
General: First release ............ 1

v0.95
General: Automatic count of pages
and questions is now filled in on
the first page. Command \textwidth added for assignment of marks to
questions and parts of questions. (The
original idea of using the optional argument of \textwidth for
this purpose was found to be
unwieldy.) Horizontal lines
now appear between questions
and information now appears
about what to expect on the
next page. Instead of three
different questions environments,
Change History

continues from the previous page.
The \section command now sets its heading flush left correctly inside the \qenum environment. .................. 1

v0.98

General: The \instructions environment is now set by \maketitle. It should now precede the \maketitle command, and a warning is now emitted if this is not the sequence. The commands \pagebreak and \newpage have been modified slightly to check if \item or \section is next and if so, issue an \endqitem first. Also, \section issues an \endqitem first. A user of the \uwaexam class should now never need to actually use \endqitem explicitly. A \goodbreak was added to \endqitem to help \LaTeX find a pagebreak between questions. A library option was added to make larger left margins for binding. Bugs in the setting of \topmargin were fixed, and \textheight and \textwidth were made slightly (0.4 cm) larger. .................. 1

v0.99

General: Added an optional argument to \coursenum. Improved the documentation. . . 1

v0.99a

General: The default value of \institution is now \textit{The University of Western Australia} (The was inserted). In order to include the course name in the exam title, (and running heads) the command \course has been added. When used, it is used in lieu of \coursenum, which has been retained. The packages \xspace and \times are now automatically loaded. The commands \numpages and \numquestions were added. An \emphinstructions environment (\textit{emphasised instructions}) added. Options \mixedcasehdrs (which sets mixed case for titlepage headers that by default are set in uppercase) and \cnameinrhead (which is to set the course name in the running head, when it is implemented) were added. .................. 1

v0.99b

General: The \emphinstructions environment has been renamed \extrinstr and the spacing interactions when the \instructions and \extrinstr environments are used or not used, improved. The package \pslatex is now loaded in lieu of package \times. The (abbreviated) course number is now set after the department in running heads. Command \coursename added. Like \coursenum it takes two arguments, the first of which is an optional abbreviation of the second. Now \course is equivalent to using \coursenum and \coursename with concatenated arguments. The optional argument for \coursename is not currently used; it awaits the implementation of option \cnameinrhead. ............. 1