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 \texttt{LATEX} document class \texttt{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.

\section*{Program documentation system}

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

\section{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.)

\subsection*{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”.

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\footnotetext[1]{10 pt type size is not allowed; it is too small for this kind of document.}
\footnotetext[2]{A \textit{constituent exam} is an exam which is taken during the term and contributes a certain percentage to the the final grade.}
\footnotetext[3]{A \textit{new exam} may be taken if you fail the ordinary exam.}
Eksamen i INF2100, 17. oktober 2008

\documentclass[norsk]{uioexam}
\usepackage[utf8]{inputenc}
\usepackage[T1]{fontenc}
\usepackage{babel,textcomp,fancyvrb}
\usepackage{newcent} %% Lettere å lese enn «Computer Modern»
\dato{17. oktober 2008}
\emne{INF2100}{Programmeringslaboratorium\med kompilatorkonstruksjon}
\tid{9.00}{12.00}
\begin{document}
\tableofcontents
\section*{Oppgave 1 Oversettelse (vekt 40\%)}
Her er et C-program. Oversett det til Java. (Dette er det første av \Nproblems~problemer på \Npages~sider.)

```java
/* Program 'gcd' */
int gcd (int a, int b) { while (a != b) {
if (a < b) { b = b-a; } else { a = a-b; }
} return a; }
```

\section*{Oppgave 2 Programmering (vekt 50\%)}
Skriv `parse`-metoden til `ifUnit`.

\section*{Deloppgave 10\% \textit{Forklaring}}
Vis hvorledes synkroniseringen med skanneren skjer.

\section*{Oppgave 3 Hva kan du ellers? (vekt 10\%)}
Skriv om noe du tror du kan.
\end{document}

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
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}`.

`\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

```latex
\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.

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\(^4\)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.