The questiontex package*

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Abstract

QuestionTEX is a collection of LATEX macros for writing multiple-choice tests.

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*This document corresponds to questiontex v0.1, dated 2014/03/29.

1 Introduction

QuestionTEX is a collection of LATEX macros that enables authors to write multiple-choice tests. The LATEX sources can then be processed in order to

- create a high quality printer's copy with standardized layout
- create a standard solution, including additional feedback
- create an interactive classroom assessment test (CAT)
- import the questions into the Moodle Learning Management System
- ... your idea here!

A basic multiple choice question may be written as

```
\question{The square root of two is \ldots}
\false{a rational number.}
  \feedback{Try to represent it as a quotient of integers!}
\true{a real number.}
\false{an imaginary number.}
```

and the corresponding standard solution is typeset by LATEX as

1. The square root of two is ...

(a) a rational number.

Try to represent it as a quotient of integers!

√ (b) a real number.

(c) an imaginary number.

For an overview of the macros available check out the `example.tex` that comes with this package. A more detailed command specification is found in section 3 of this document.

2 Deployment mechanisms

2.1 Creation of a solution

Use `latex` or `pdflatex` to create a standard solution of your test in `.dvi` or `.pdf` format. The solution indicates, which answers are true. If provided, it also includes feedback on individual answers and/or a general explanation of the question.

2.2 Creation of a printer's copy

Use the `\hidesolution` macro to hide all solution meta data and produce a printer's copy of your test, ready to be handed out to students.

2.3 Creation of an interactive online-test

This feature is not fully automated yet, but a user friendly upload mechanism with graphical user interface is coming up soon (2010). At the moment, you can send us an email with your source and preferred grading rules and we will set up the test on our system.

2.4 Import of questions into Moodle

A QuestionTEX plugin for the Moodle Learning Management System is available from `moodle.org/plugins`. It provides a QuestionTEX import/export format for multiple choice questions.

After the installation you will be able to upload your QuestionTEX sources directly to Moodle. In case your sources include image files, you may create a zip archive with all the relevant files and upload the zip instead.

Note: Since Moodle does not come with a built-in LaTeX distribution, certain restrictions must be obeyed in order to ensure proper display of your questions in Moodle (detailed information in section 4.1).

3 Command reference

All commands are sorted alphabetically.

3.1 Writing questions

This is a selection of the available commands for writing questions. In order to see some examples for questions, have a look at the `example.tex` that comes with this package.

`\explanation` May be used to outline an approach to the solution. If present, this command will normally be placed at the very end of a question. When the questions are deployed in a static context, the visibility of the explanation may be controlled by `\hidesolution`.

`\false` Contains a wrong answer.
`\false{Some wrong answer.}`

`\feedback` If you want to give a feedback to a specific answer, you may do so by using the feedback-command *after the answer*.
This is especially useful, when the questions are deployed in an interactive context, since the feedback to a student will then depend on his or her answers. In a static context the display of feedbacks can be controlled by `\hidesolution`.

`\includegraphics` Should be used to include images. LaTeX compilation supports the `eps` format, while PdfLaTeX supports `png`, `jpg`, `tiff` and `pdf`.

Images may be included everywhere, where ordinary text can appear, i.e. they may be part an answer, a feedback or the like:
`\feedback{Correct! \includegraphics[height=1cm]{smiley.png}}`

`\intro` Inserts arbitrary text that is not an argument to another command into the quiz.

`\keepme` Same as `\intro`.

`\question` Defines the question text. An identifier of the question may be supplied via the optional parameter. The identifier must consist only of letters of the English alphabet and the underscore _ :
`\question[Identifier_1]{Now, ain't that easy?}`

`\questionSc` Like `\question`, but specifies that this question has exactly one correct answer. This is relevant in interactive contexts, where students may be restricted to selecting a single answer only.

`\true` Contains a true answer. A question may have multiple true answers.
`\true{My true answer}`

3.2 Setting global properties

The following commands define global properties of the quiz. They should appear *before* the first question.

`\hidesolution` Hides all solution-related meta data, i. e., only questions and answers are shown.

4 Appendix

4.1 Restrictions for Moodle import

As of today (2014), there are two main display mechanisms in Moodle

1. The browser processes HTML. It does not understand LaTeX at all.
2. Plug-ins like mimeTeX, MathJax or JsMath process formulae that are enclosed by certain delimiters and convert them into graphics. They do understand appreciable parts of LaTeX but not everything.

Since plain text and images are processed directly by the browser, while formulae are processed by the plug-in, different rules apply.

4.1.1 Plain text

Everything that is not part of any type of equation environment (like `$\ldots$`, 'eqnarray', etc.), is treated as plain text. *Only* the LaTeX commands that are present in the following list, may be used here. The ones in the list are either translated into their respective HTML entities or simply discarded (i.e. deleted).

- *Translated* are:
  - \\, ~

  - `\emph{...}`, `\textit{...}`, `\textbf{...}`, `\underline{...}`, `\(...\)`
  - `\begin{center}...\end{center}`
  - `\{`, `\}`, `\textbackslash`
  - umlaute

- *Discarded* are:
  - `\vskip`, `\,`

These lists may be extended on demand. Just send us an email with your request for modification.

4.1.2 Images

Moodle allows for the types `png`, `jpg`, `gif`, i.e. `eps` and `pdf` may not be used.

4.1.3 Formulae

This refers to symbols that are enclosed by an equation environment (like `$\ldots$`, 'eqnarray', etc.). The restrictions depend on the plug-in that is being used to display formulae. Below, you find the result from our experience with mimeTeX.

- The definition of new macros is only allowed, if they do not take parameters (we do not replace #1 and the like). Also, this feature is still in beta stage.
- Don't use references.
- Don't use `\makebox`

4.1.4 Grading

Since there is no possibility to specify additional parameters during question import into Moodle, we had to define a standard here:
The `\question` macro distributes the full 100% equally among its true answers, while false answers count as −100% in order to punish guessing.
The `\questionSc` macro does not punish guessing; false answers count as 0%.

5 Implementation

```
1 \newcommand{\toNemFileNoArg}[1]{}
2 \newcommand{\toNemFile}[2]{}
3 \newcommand{\generateNemFile}{%
4     \newwrite\nemesisWrite%
5     \immediate\openout\nemesisWrite=\jobname.nem%
6     \newtoks\nemesisToks%
7     \renewcommand{\toNemFileNoArg}[1]{%
8         \immediate\write\nemesisWrite{##1}%
```

```
        \immediate\write\nemesisWrite{0}%
    }%
    \renewcommand{\toNemFile}[2]{%
        \immediate\write\nemesisWrite{##1}%
        \immediate\write\nemesisWrite{1}%
        \nemesisToks={##2}%
        \immediate\write\nemesisWrite{\the\nemesisToks}%
    }%
}

\newcommand{\keepme}[1]{\toNemFile{keepme}{#1}{#1}}
\newcommand{\intro}[1]{\toNemFile{intro}{#1}{#1}}

\newcounter{questionOrdinal}
\setcounter{questionOrdinal}{0}

\newcounter{answerOrdinal}
\setcounter{answerOrdinal}{0}

\newcommand{\question}[1]{%
    \addtocounter{questionOrdinal}{1}%
    \setcounter{answerOrdinal}{0}%
    \toNemFile{question}{#1}%
    \styleQuestion{#1}%
}

\newcommand{\questionSc}[1]{%
    \addtocounter{questionOrdinal}{1}%
    \setcounter{answerOrdinal}{0}%
    \toNemFile{questionSc}{#1}%
    \styleQuestionSc{#1}%
}

\newcommand{\true}[1]{%
    \addtocounter{answerOrdinal}{1}%
    \toNemFile{true}{#1}%
    \styleTrue{#1}%
}

\newcommand{\false}[1]{%
    \addtocounter{answerOrdinal}{1}%
    \toNemFile{false}{#1}%
    \styleFalse{#1}%
}

\newcommand{\feedback}[1]{%
    \toNemFile{feedback}{#1}%
    \styleFeedback{#1}%
}

```

```
\newcommand{\explanation}[1]{%
    \toNemFile{explanation}{#1}%
    \styleExplanation{#1}%
}


\newcommand{\hidesolution}{%
    \renewcommand{\feedback}[1]{%
        \toNemFile{feedback}{##1}%
    }%
    \renewcommand{\explanation}[1]{%
        \toNemFile{explanation}{##1}%
    }%
    \renewcommand{\styleTrue}{%
        \styleTrueHidden%
    }%
    \renewcommand{\styleFalse}{%
        \styleFalseHidden%
    }%
    \renewcommand{\styleDunno}{%
        \styleDunnoHidden%
    }%
}


\newcommand{\styleQuestion}[1]{#1}
\newcommand{\styleQuestionSc}[1]{#1}
\newcommand{\styleTrue}[1]{#1}
\newcommand{\styleFalse}[1]{#1}
\newcommand{\styleFeedback}[1]{#1}
\newcommand{\styleExplanation}[1]{#1}

\newcommand{\styleTrueHidden}[1]{#1}
\newcommand{\styleFalseHidden}[1]{#1}

\newcommand{\styleSolutionQuestion}[1]{#1}
\newcommand{\styleSolutionQuestionSc}[1]{#1}

\newcommand{\styleTrueSol}[1]{#1}
\newcommand{\styleFalseSol}[1]{#1}
\newcommand{\styleSolutionExplanation}[1]{#1}
\newcommand{\styleSolutionFeedback}[1]{#1}


\renewcommand{\styleQuestion}[1]{%
    \bigskip%
    \filbreak%
    \noindent {\bf\arabic{questionOrdinal}.\ }{#1}%
}

```

```
\renewcommand{\styleQuestionSc}{\styleQuestion}

\renewcommand{\styleTrue}[1]{%
    \begin{itemize}%
        \item[\begin{tabular}{rr}$\surd$&(\alph{answerOrdinal})\end{tabular}]{#1}
    \end{itemize}%
}

\renewcommand{\styleFalse}[1]{%
    \begin{itemize}%
        \item[\begin{tabular}{rr}&(\alph{answerOrdinal})\end{tabular}]{#1}
    \end{itemize}%
}

\renewcommand{\styleFeedback}[1]{%
    \begin{itemize}%
        \item[]{\par{\footnotesize{#1}}}%
    \end{itemize}%
}

\renewcommand{\styleFalseHidden}[1]{%
    \begin{itemize}%
        \item[\begin{tabular}{rr}&(\alph{answerOrdinal})\end{tabular}]{#1}
    \end{itemize}%
}

\renewcommand{\styleTrueHidden}[1]{%
    \begin{itemize}%
        \item[\begin{tabular}{rr}&(\alph{answerOrdinal})\end{tabular}]{#1}
    \end{itemize}%
}

\renewcommand{\styleSolutionQuestion}[1]{%
    \bigskip%
    \filbreak%
    \noindent {\bf\arabic{questionOrdinal}.\ }%
    {\scriptsize {#1}}%
}

\renewcommand{\styleSolutionQuestionSc}{\styleSolutionQuestion}

\renewcommand{\styleTrueSol}[1]{%
    \begin{itemize}%
        \item[%
            \begin{tabular}{rr}%
                $\surd$&(\alph{answerOrdinal})%
            \end{tabular}%
            ]%
            {\scriptsize {#1}}
    \end{itemize}%
```

```
}

\renewcommand{\styleFalseSol}[1]{%
    \begin{itemize}%
        \item[%
            \begin{tabular}{rr}%
                &(\alph{answerOrdinal})%
            \end{tabular}%
            ]%
            {\scriptsize {#1}}
    \end{itemize}%
}

\renewcommand{\styleSolutionExplanation}[1]{%
    \par\noindent {#1}%
}

\renewcommand{\styleSolutionFeedback}[1]{%
    \begin{itemize}%
        \item[]{\par{#1}}%
    \end{itemize}%
}

```