The tma Package*

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? (?)

Abstract

The tma package provides macros and environments to assist in writing Tutor Marked Assessments (TMAs) for Open University courses.

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*This document corresponds to tma ?, dated ?.

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1 Introduction

The tma package simplifies the creation of TMAs by providing an environment to encompass answers to questions commands to enumerate parts and subparts of those questions, and a set of macros facilitating mathematical entry based on the styles used by the Open University.

2 Compiling and installing tma

To compile the tma package:

Enter ⇒ `pdflatex tma.ins`

To compile the tma documentation:

Enter ⇒ `pdflatex tma.dtx`

(several times)

Enter ⇒ `makeindex -s gglo.ist -o tma.gls tma.glo`

Enter ⇒ `makeindex -s gind.ist tma`

Enter ⇒ `pdflatex tma.dtx`

(severl times)

The file `tma.sty` should be placed in an appropriate location within the TEX directory structure. For example in a directory such as `tex/latex/tma`.

3 Usage

To use the `tma` package, in its most basic form, it should be included in the preamble of your LATEX document:

```
\documentclass[a4paper,11pt]{article}
\usepackage{tma}
⋮
\begin{document}
⋮
\end{document}
```

3.1 Options

A number of options are available to modify the results of using the `tma` package. These should be included within the `\usepackage` declaration:

`\usepackage[`⟨*option,...*⟩`]`tma

The following options are available:

`alph` (*Opt*) []
: `[alph]` (default) question numbering as 1(b)(iii);

`roman` (*Opt*) []
: `[roman]` varies question numbering to sequence used by M381 i.e. 1(ii)(c);

`cleveref` (*Opt*) []
: `[cleveref]` question numbering creates automatic referencing for use with cleveref package;

`pdfbookmark` (*Opt*) []
: `[pdfbookmark]` add PDF bookmarks for each question using hyperref package; and

`legacy` (*Opt*) []
: `[legacy]` enables old definitions of `\vec` and `\C` for backward compatibility.

3.2 Macros and environments

The tma package provides several valuable macros and environments, most documented here.

3.2.1 Document level commands

The document-level commands are intended for use within the document's preamble. They generally affect what appears on the title page and the headers/footers.

`\myname []` The most essential part of an assignment is to identify who it has been written by and what it has been written for. To this end, the `\myname` macro is used to specify your name: this should be your name as recorded with the University. As names are not unique, the Open University allocates a Personal Identification Number (or PIN) as a unique identifier for each student; this should be declared with the `\mypin` macro. It is formed by a letter, followed by seven digits—or six digits and a letter `X`. Once the personal identification has been done, the module being worked needs to be declared, the course code of your module should be given with the `\mycourse` macro and the number of the assignment using the `\mytma` macro. Note that this is just the assignment number; there is no need to include the characters `TMA`. The final document level command is used if you wish to set a specific date that will be displayed on the compiled document title page; you may use `\setdate`. This will override the default of using the compile date.

`\mypin []`

`\mycourse []`

`\mytma []`

`\setdate []`

Example:

```
\myname{Anthony Neil Other}
\mypin{A1234567}
\mycourse{M101} % The original Maths introduction module
\mytma{02} % TMA02
\setdate{March 2025}
```

3.2.2 Question environment commands

These commands are the ones that, though few, comprise the bulk of the body of the TMA answer content of a paper.

`question` (*env.*) Within a TMA, each question should be answered in a `question` environment. The question number is automatically incremented unless one is

specified in the optional parameter. Since the question is presented as an environment, it is convenient to place each question in a separate file to be included in the main paper.

`\qpart []` Often questions are comprised of multiple parts, therefore, `\qpart` indicates the start of a question part. It will set the part identifier within the left-hand margin space. Normally, the parts are lettered as `a`, `b`, `c`... unless the option `roman` has been given to the `tma` package when the parts are numbered as `i`, `ii`, `iii`... As with the actual questions, this is an auto-incrementing value unless an optional value is given. Note that the value should be numerical even if the parts are lettered or in Roman numerals. Each new question restarts the numbering at 1, which will be rendered as `a` or `i` as dictated by the options in effect.

`\qsubpart []` There are occasions that the parts of questions may be further divided into sub-parts; these may be declared using the `\qsubpart` macro. As with `\qpart`, this is set in the left margin and automatically incremented: an option to choose the sub-part number is also available. If a `\qsubpart` immediately follows a `\pqart`, both marginal markers will be set on the same line.

Note that `question` is an environment to be used with the `\begin`...`\end` structure, `\qpart` and `\qsubpart` are both macros that lay down titles in the margin and are designed to be used on a line on their own.

Example:

```
\begin{question}[⟨question number⟩]
⋮
\qpart[⟨part number⟩]
⋮
\qsubpart[⟨sub-part number⟩]
⋮
\end{question}
```

3.2.3 Mathematical symbology

Various mathematical symbols and elements are defined for convenience, working from the normal suggested formats used within Open University courses.

4 Implementation

```
%% tma.sty
%% Copyright 2025 G. I. Riley <geoffr@adaso.com>
%
% This work may be distributed and/or modified under the
% conditions of the LaTeX Project Public License, either version 1.3
% of this license or (at your option) any later version.
% The latest version of this license is in
%   http://www.latex-project.org/lppl.txt
% and version 1.3 or later is part of all distributions of LaTeX
% version 2005-12-01 or later.
%
% This work has the LPPL maintenance status 'maintained.'
%
% The Current Maintainer of this work is Geoff Riley.
%
%% This package may be freely used, especially by, but not limited to, students,
%% lecturers and staff of the Open University. It was created by the
%% efforts of many who are now or have been connected with the Open University
%% Students Association. No acknowledgement is _required_ for using this package
%% within the production of a _Tutor Marked Assessment._
```

Adapted by Peter McFarlane from various sources. All errors of style or content are mine or subsequent contributors. Acknowledgements to Bob Margolis and Rob Lynas (from whom some macros are plagiarised). Further contributions from Steve Mayer and Tim Dale. Annotations, in part, and further modification by Geoff Riley.

Package Options

- `[alph]` (default) question numbering as 1(b)(iii)
- `[roman]` varies question numbering to sequence used by M381 i.e. 1(ii)(c)
- `[cleveref]` question numbering creates automatic referencing for use with cleveref package
- `[pdfbookmark]` add PDF bookmarks for each question using hyperref package
- `[legacy]` enables old definitions of `\vec` and `\C` for backward compatibility

To use a package option, place the option(s) before the package name: `\usepackage[roman,cleveref]{tma}`

```
\RequirePackage{expl3} % LaTeX3 "experimental"
```

4.1 Package Initialisation

```
% %%%%%%%%%%%%%%%%%%%%%%%%%
%% Package Initialization
% %%%%%%%%%%%%%%%%%%%%%%%%%
\ExplSyntaxOn
\tl_new:N \g_tma_constant_name
\tl_new:N \g_tma_constant_tma
\tl_new:N \g_tma_constant_course
\tl_new:N \g_tma_constant_pin
\tl_new:N \g_tma_constant_thedate

\tl_gset:Nn \g_tma_constant_name {name}
\tl_gset:Nn \g_tma_constant_tma {tma}
\tl_gset:Nn \g_tma_constant_course {course}
\tl_gset:Nn \g_tma_constant_pin {pin}
\tl_gset:Nn \g_tma_constant_thedate {the~date}

\newcommand{\name}{\g_tma_constant_name}
\newcommand{\tma}{\g_tma_constant_tma}
\newcommand{\course}{\g_tma_constant_course}
\newcommand{\pin}{\g_tma_constant_pin}
\newcommand{\thedate}{\g_tma_constant_thedate}

\NewDocumentCommand{\myname}{m}{%
 \tl_gset:Nn \g_tma_constant_name{#1}}
\NewDocumentCommand{\mytma}{m}{%
 \tl_gset:Nn \g_tma_constant_tma{#1}}
\NewDocumentCommand{\mycourse}{m}{%
 \tl_gset:Nn \g_tma_constant_course{#1}}
\NewDocumentCommand{\mypin}{m}{%
 \tl_gset:Nn \g_tma_constant_pin{#1}}
\NewDocumentCommand{\setdate}{m}{%
 \date{#1}\tl_gset:Nn \g_tma_constant_thedate{#1}}
\ExplSyntaxOff

\title{\textbf{TMA: \course-\tma}}
\author{\textbf{\name\space\pin}}


\NewDocumentCommand{\tma@questionstring}{}{\relax}
\NewDocumentCommand{\setquestionstring}{m}{%
 \RenewDocumentCommand{\tma@questionstring}{}{#1}}
\setdate{\today}

```

4.2 Package Loading

```
% %%%%%%%%%%%%%%%%%%%%%%%%%
```

```
%% Package Loading
% %%%%%%%%%%%%%%%%%%%%%%%%%%%%
\RequirePackage{amsmath}
\RequirePackage{amssymb}
\RequirePackage{amsthm}
\RequirePackage{wasysym}
\RequirePackage{bm}
\RequirePackage{upgreek}
\RequirePackage{graphicx}
\RequirePackage{lastpage}
\RequirePackage{xifthen}
\RequirePackage{verbatim}
\RequirePackage{fancyhdr}
\RequirePackage{geometry}
\RequirePackage{calc}
\RequirePackage[UKenglish]{isodate} % use UK format for date
\cleanlookdateon % remove th,st, rd from date

```

4.3 Geometry Settings

```
% %%%%%%%%%%%%%%%%%%%%%%%%%%%%
%% Geometry Settings
% %%%%%%%%%%%%%%%%%%%%%%%%%%%%

\geometry{
 headheight=10mm,
 headsep=5mm,
 bottom=25mm,
 footskip=15mm,
 left=30mm,
 right=30mm,
 marginparwidth=0mm,
 marginparsep=0mm,
 includemp
}

```

4.4 Margin Notes

```
% %%%%%%%%%%%%%%%%%%%%%%%%%%%%
%% Margin Notes
% %%%%%%%%%%%%%%%%%%%%%%%%%%%%

\NewDocumentCommand{\marginnote}{m}{\marginpar{#1}}
\NewDocumentCommand{\marginnotes}{}{
 \geometry{
  marginparwidth=40mm,
```

```
  marginparsep=5mm,
  left=20mm,
  right=15mm
 }
}

```

4.5 Question Numbering

```
% %%%%%%%%%%%%%%%%%%%%%%%%%%%
%% Question Numbering
% %%%%%%%%%%%%%%%%%%%%%%%%%%%

\newcounter{question}
\newcounter{qpart}[question]
\newcounter{qsubpart}[qpart]
\renewcommand{\thequestion}{\arabic{question}}

```

4.6 Option Handling

```
% %%%%%%%%%%%%%%%%%%%%%%%%%%%
%% Option Handling
% %%%%%%%%%%%%%%%%%%%%%%%%%%%
% Define boolean flags
\newif\iftma@roman
\newif\iftma@usecleveref
\newif\iftma@usepdfbookmark
\newif\iftma@legacy

% Set default options
\tma@romanfalse          % Default numbering is 'alph'
\tma@usecleverefffalse   % Default is not to use cleveref
\tma@usepdfbookmarkfalse % Default is not to use pdfbookmark
\tma@legacyfalse         % Default is not to use legacy definitions

% Define commands with default values
\renewcommand{\theqpart}{\alph{qpart}}
\renewcommand{\theqsubpart}{\roman{qsubpart}}
\NewDocumentCommand{\tma@crefname}{mmm}{\relax}
\NewDocumentCommand{\tma@stepcounter}{m}{\stepcounter{#1}}
\NewDocumentCommand{\tma@bookmark}{O{0}mm}{\relax}
\NewDocumentCommand{\tma@pageref}{m}{\pageref{#1}}

% Declare options
\DeclareOption{roman}{%
 \tma@romantrue%
}

```

```
\DeclareOption{alph}{%
 \tma@romanfalse%
}

\DeclareOption{cleveref}{%
 \tma@usecleverefttrue%
}

\DeclareOption{pdfbookmark}{%
 \tma@usepdfbookmarktrue%
}

\DeclareOption{legacy}{%
 \tma@legacytrue%
}

\DeclareOption*{%
 \PackageWarning{tma}{Unknown option `\CurrentOption'}%
}

% Process options
\ProcessOptions\relax

```

4.7 Debugging Options

```
\typeout{*************** OPTION RESULTS **********}
\iftma@usepdfbookmark
\typeout{pdfbookmark is TRUE}
\else
\typeout{pdfbookmark is FALSE}
\fi
\iftma@roman
\typeout{roman is TRUE}
\else
\typeout{roman is FALSE}
\fi
\iftma@usecleveref
\typeout{cleveref is TRUE}
\else
\typeout{cleveref is FALSE}
\fi
\iftma@legacy
\typeout{legacy is TRUE}
\else
\typeout{legacy is FALSE}
\fi
\typeout{************* END OPTION RESULTS **********}

```

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4.8 Package adjustments based on Options

```
199 % %%%%%%%%%%%%%%%%%%%%%%%%%%%%
200 %% Set Up Package Based on Options
201 % %%%%%%%%%%%%%%%%%%%%%%%%%%%%
202
203 % Set question numbering
204 \iftma@roman
205 \renewcommand{\theqpart}{\roman{qpart}}
206 \renewcommand{\theqsubpart}{\alph{qsubpart}}
207 \else
208 \renewcommand{\theqpart}{\alph{qpart}}
209 \renewcommand{\theqsubpart}{\roman{qsubpart}}
210 \fi
211 % Load hyperref if necessary
212 \iftma@usepdfbookmark
213 \AtBeginDocument{%
214  \hypersetup{%
215   colorlinks=true,%
216   linkcolor=blue,%
217   urlcolor=blue,%
218   pdfstartview=FitH,%
219   pdftitle={TMA~\tma}, %
220   pdfauthor={\name~|~\pin}, %
221   pdfkeywords={OUCU:~\pin, TMA~\tma}, %
222   pdfsubject=\course%
223  }%
224 }
225 \RequirePackage[pdfencoding=unicode,psdextra]{hyperref}
226 \fi
227
228 % Load cleveref if necessary
229 \iftma@usecleveref
230 % Ensure hyperref is loaded before cleveref
231 \@ifpackageloaded{hyperref}%
232 {}%
233 {\RequirePackage[pdfencoding=unicode,psdextra]{hyperref}}
234 \RequirePackage{cleveref}
235 % Redefine commands for cleveref
236 \RenewDocumentCommand{\tma@crefname}{mmm}{\crefname{#1}{#2}{#3}}
237 \RenewDocumentCommand{\tma@stepcounter}{m}{\refstepcounter{#1}}
238 \fi
239
240 % Redefine commands for pdfbookmark
241 \iftma@usepdfbookmark
242 \RenewDocumentCommand{\tma@pageref}{m}{\pageref*{#1}}
243 \RenewDocumentCommand{\tma@bookmark}{O{0} +m +m}{%
```

```
 \pdfbookmark[#1]{#2}{#3}%
}
\fi

\setquestionstring{Q}

```

4.9 Question Environment

```
% %%%%%%%%%%%%%%%%%%%%%%%%%%
%% Question Environment
% %%%%%%%%%%%%%%%%%%%%%%%%%%

% Set up cref names if cleveref is used
\iftma@usecleveref
\tma@crefname{question}{question}{questions}
\tma@crefname{qpart}{part}{parts}
\tma@crefname{qsubpart}{section}{sections}
\fi

\NewDocumentEnvironment{question}{O{0}}{%
 \ifthenelse{#1>0}{\setcounter{question}{#1-1}}{\relax}%
 \tma@stepcounter{question}%
 \tma@bookmark{Question \thequestion}%
  {question\thequestion}%
 \makebox[0em][r]{\large{\tma@questionstring~\thequestion\hspace{0.3em}}}\par%
}{%
 \par \vspace{3em}%
}

\NewDocumentCommand{\qpart}{O{0}}{%
 \ifthenelse{#1>0}{\setcounter{qpart}{#1-1}}{\relax}%
 \tma@stepcounter{qpart}%
 \tma@bookmark[1]{\thequestion.\theqpart}%
  {qpart.\thequestion.\theqpart}%
 \par%
 \makebox[0pt][r]{\large{(\theqpart)\hspace{1.5em} }}%
}

\NewDocumentCommand{\qsubpart}{O{0}}{%
 \ifthenelse{#1>0}{\setcounter{qsubpart}{#1-1}}{\relax}%
 \tma@stepcounter{qsubpart}%
 \tma@bookmark[2]{\thequestion.\theqpart.\theqsubpart}%
  {qsubpart.\thequestion.\theqpart.\theqsubpart}%
 \ifthenelse{\value{qsubpart}>1}%
 {\par}{}%
 \hspace{-2em}\makebox[2em][l]{\large{(\theqsubpart)}}%
}

```

4.10 Mathematical commands

```
% %%%%%%%%%%%%%%%%%%%%%%%%%%%
%% Mathematical Commands
% %%%%%%%%%%%%%%%%%%%%%%%%%%%

%% Differential Operators
\NewDocumentCommand{\dd}{}{\ensuremath{\mathop{}\!\mathrm{d}}}
\NewDocumentCommand{\e}{}{\ensuremath{\mathrm{e}}}
\NewDocumentCommand{\ii}{}{\ensuremath{\mathrm{i}}}

%% Number Sets
\NewDocumentCommand{\N}{}{\ensuremath{\mathbb{N}}}
\NewDocumentCommand{\Z}{}{\ensuremath{\mathbb{Z}}}
\NewDocumentCommand{\Q}{}{\ensuremath{\mathbb{Q}}}
\NewDocumentCommand{\R}{}{\ensuremath{\mathbb{R}}}
\NewDocumentCommand{\Complex}{}{%
 \ensuremath{\mathbb{C}}} % Changed from \C to \Complex
\NewDocumentCommand{\Rr}{}{\ensuremath{\mathcal{R}}}

%% Vector Notation
\NewDocumentCommand{\vect}{m}{%
 \ensuremath{\overrightarrow{#1}}} % Changed from \vec to \vect
\NewDocumentCommand{\ve}{m}{\ensuremath{\textbf{#1}}}

%% Superscript Notations
\NewDocumentCommand{\st}{}{\textsuperscript{st}}
\NewDocumentCommand{\nd}{}{\textsuperscript{nd}}
\NewDocumentCommand{\rd}{}{\textsuperscript{rd}}
\NewDocumentCommand{\nth}{}{\textsuperscript{th}}

% Additional Symbols
\NewDocumentCommand{\rect}{}{\ensuremath{\sqsubset\!\!\sqsupset}}

%% Combinatorial Notations
\NewDocumentCommand{\comb}{mm}{\ensuremath{{}^{#1}C_{#2}}}
\NewDocumentCommand{\perm}{mm}{\ensuremath{{}^{#1}P_{#2}}}

%% Mathematical Operators
\DeclareMathOperator{\re}{Re}
\DeclareMathOperator{\im}{Im}
\DeclareMathOperator{\Log}{Log}
\DeclareMathOperator{\Arg}{Arg}
\DeclareMathOperator{\Wnd}{Wnd}
\DeclareMathOperator{\Res}{Res}
\DeclareMathOperator{\Ker}{Ker}
\DeclareMathOperator{\Orb}{Orb}
\DeclareMathOperator{\Stab}{Stab}
\DeclareMathOperator{\Fix}{Fix}
```

```
%% Derivatives
\NewDocumentCommand{\deriv}{mm}{%
 \frac{\mathrm{d}#1}{\mathrm{d}#2}}
\NewDocumentCommand{\pderiv}{mm}{%
 \frac{\partial #1}{\partial #2}}
\NewDocumentCommand{\psderiv}{mmm}{%
 \frac{\partial^2 #1}{\partial #2 \partial #3}}

% Legacy Definitions
\iftma@legacy
% Redefine \vec to old definition
\RenewDocumentCommand{\vec}{m}{\ensuremath{\overrightarrow{#1}}}
% Redefine \C to old definition
\ProvideDocumentCommand{\C}{}{\ensuremath{\mathbb{C}}}
\RenewDocumentCommand{\C}{}{\ensuremath{\mathbb{C}}}
\fi
```

4.11 Theorem Environment

```
% %%%%%%%%%%%%%%%%%%%%%%%%%%%%
%% Theorem Environment
% %%%%%%%%%%%%%%%%%%%%%%%%%%%%

\newtheorem{lemma}{Lemma}
\newtheorem{theorem}{Theorem}
% Define \blacksmiley without loading wasysym
\ProvideDocumentCommand{\blacksmiley}{}{%
 \ensuremath{\unicode{263B}}} % Unicode for blacksmiley emoji
\RenewDocumentCommand{\qedsymbol}{}{\blacksmiley}
```

4.12 Miscellaneous Settings

```
% %%%%%%%%%%%%%%%%%%%%%%%%%%%%
%% Miscellaneous Settings
% %%%%%%%%%%%%%%%%%%%%%%%%%%%%

\RenewDocumentCommand{\thefootnote}{}{\fnsymbol{footnote}}
\numberwithin{equation}{question}
\setlength{\parindent}{0pt}
\setlength{\parskip}{2ex plus 0.3ex minus 0.2ex}
```

4.13 Header and Footer Settings

```
% %%%%%%%%%%%%%%%%%%%%%%%%%%%%
%% Header and Footer Settings
```

```
% %%%%%%%%%%%%%%%%%%%%%%%%%%%
\pagestyle{fancy}
\fancyhf{} % Clear all headers and footers
\fancyhead[L]{\textrm{\name\ \pin}}
\fancyhead[C]{\textrm{\course\ TMA-\tma}}
\fancyhead[R]{\textrm{Page \thepage\ of \tma@pageref{LastPage}}}
\RenewDocumentCommand{\headrulewidth}{}{0pt} % Remove header rule

% %%%%%%%%%%%%%%%%%%%%%%%%%%%
%% End of Package
% %%%%%%%%%%%%%%%%%%%%%%%%%%%

\endinput
```

Change History

v1.12

General: Standardized package name to 'tma' to make it compatible with CTAN. Avoided redefining standard LaTeX commands. Consolidated geometry settings. Adjusted loading order of packages. Improved code readability and comments. Added 'legacy' option to allow old definitions of `\vec` and `\C`. . 5

v1.13

General: Arranged for `\qsubpart` to go on the same line as the `\qpart` when there is no intervening text `\qsubpart` indents further than `\qpart`. 5

v1.14

General: Allow replacement of Question marker tag using `\setquestionstring`. References with cleveref not working. Replaced my attempts at keeping `\qpart` and `\qsubpart` on the same line with Steve Mayers contribution. 5

v1.15

General: Define `\setdate` and `\thedate` to allow the header date to be used within the document, eg header and footer. 5

v1.16

General: Added File Properties to pdf files using the hyperref setup system when in pdfbookmark mode. 5

v1.17

General: Rewritten with LaTeX3 syntax from the 'xparse' package to make commands less fragile. Finally, I got the alignment of part and subpart numbering to line up correctly. 5

v1.18

General: PDF metadata doesn't set correctly so I have removed it: the cause is an incompatibility between LaTeX unicode and the PDF restricted character allowance. 5

v1.19
General: PDF metadata (apparently) was solved with help from Steve Mayers; all down to the use of commands as string containers. New (LaTeX3) commands are robust and fail to expand within the context of the metadata and bookmarks; old (LaTeX2e) commands are fragile and correctly expanded. I have a mix of old commands and new variables now. 5

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Numbers written in italic refer to the page where the corresponding entry is described; numbers underlined refer to the code line of the definition; numbers in roman refer to the code lines where the entry is used.

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\! ℓ-295, ℓ-320
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