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.

Contents

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.

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[*]This document corresponds to **tma** ?, dated ?.

2   Usage

To use the `tma` package, it should be included in the preamble of your LaTeX document:

```
\documentclass[a4paper,11pt]{article}
\usepackage{tma}
```

2.1   Options

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

$\usepackage[\langle option \rangle]$tma

The following options are available:

- `[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

2.2   Macros and environments

The `tma` package provides a number of useful macros and environments, the majority are documented here.

2.2.1   Document level commands

The document level commands are those that are intended to be used within the preable of the document. They generally affect what appears on the title page and in the headers/footers.

`\myname`   The `\myname` macro is used to specify your name: this should be your name as recorded with the University.

`\mypin`   Nothing to do with credit cards, this `\mypin` is your Open University Personal Identification Number. It is formed by a letter, followed by seven digits or six digits and a letter `X`.

`\mycourse`   Declare the course code of your module with the `\mycourse` macro.

`\mytma`   Use the `\mytma` macro to declare the number of the Tutor Marked Assignment that is being answered in this document.

If you wish to set a specific date that will be displayed on the compiled docu-
`\setdate` ment title page, you may use `\setdate`.

Example:

```
\myname{Anthony Neil Other}
\mypin{A1234567}
```

```
\mycourse{M101} % The original Maths introduction module
\mytma{02} % TMA02
\setdate{March 2025}
```

2.2.2 Question environment commands

These commands are the ones that, though few in number, 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.

Example:

> \begin{question}[⟨*question number*⟩]
> ...
> \end{question}

\qpart

\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`. . .

This is am auto-incrementing value, unless an optional value is given.

Example:

> \qpart[⟨*part number*⟩]

Note that the value should be given as a numerical value even if the parts are lettered or roman numerals.

\qsubpart

The

3   Implementation

```
1 %% tma.sty
2 %% Copyright 2025 G. I. Riley
3 %
4 % This work may be distributed and/or modified under the
5 % conditions of the LaTeX Project Public License, either version 1.3
6 % of this license or (at your option) any later version.
7 % The latest version of this license is in
8 %   http://www.latex-project.org/lppl.txt
9 % and version 1.3 or later is part of all distributions of LaTeX
10 % version 2005-12-01 or later.
11 %
12 % This work has the LPPL maintenance status 'maintained'.
13 %
14 % The Current Maintainer of this work is G. I. Riley.
15 %
16 %% This package may be freely used, especially by, but not limited to, students,
17 %% lecturers and staff of the Open University. It has been created by the
18 %% efforts of many who are now or have been connected with the Open University
```

```
19 %% Students Association. No acknowledgement is _required_ for using this package
20 %% 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 also 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}`

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

3.1   Package Initialisation

```
22 %%%%%%%%%%%%%%%%%%%%%%%%%
23 %% Package Initialization
24 %%%%%%%%%%%%%%%%%%%%%%%%%
25 \ExplSyntaxOn
26 \tl_new:N \g_tma_constant_name
27 \tl_new:N \g_tma_constant_tma
28 \tl_new:N \g_tma_constant_course
29 \tl_new:N \g_tma_constant_pin
30 \tl_new:N \g_tma_constant_thedate
31
32 \tl_gset:Nn \g_tma_constant_name {name}
33 \tl_gset:Nn \g_tma_constant_tma {tma}
34 \tl_gset:Nn \g_tma_constant_course {course}
35 \tl_gset:Nn \g_tma_constant_pin {pin}
36 \tl_gset:Nn \g_tma_constant_thedate {the~date}
37
38 \newcommand{\name}{\g_tma_constant_name}
39 \newcommand{\tma}{\g_tma_constant_tma}
40 \newcommand{\course}{\g_tma_constant_course}
41 \newcommand{\pin}{\g_tma_constant_pin}
42 \newcommand{\thedate}{\g_tma_constant_thedate}
43
44 \NewDocumentCommand{\myname}{m}{%
45  \tl_gset:Nn \g_tma_constant_name{#1}}
46 \NewDocumentCommand{\mytma}{m}{%
47  \tl_gset:Nn \g_tma_constant_tma{#1}}
48 \NewDocumentCommand{\mycourse}{m}{%
```

```
49  \tl_gset:Nn \g_tma_constant_course{#1}}
50 \NewDocumentCommand{\mypin}{m}{%
51 \tl_gset:Nn \g_tma_constant_pin{#1}}
52 \NewDocumentCommand{\setdate}{m}{%
53 \date{#1}\tl_gset:Nn \g_tma_constant_thedate{#1}}
54 \ExplSyntaxOff
55
56 \title{\textbf{TMA: \course-\tma}}
57 \author{\textbf{\name\space\pin}}
58
59
60 \NewDocumentCommand{\tma@questionstring}{}{\relax}
61 \NewDocumentCommand{\setquestionstring}{m}{%
62 \RenewDocumentCommand{\tma@questionstring}{}{#1}}
63 \setdate{\today}
64
```

3.2   Package Loading

```
65 %%%%%%%%%%%%%%%%%%%%%%%%%%%%
66 %% Package Loading
67 %%%%%%%%%%%%%%%%%%%%%%%%%%%%
68
69 \RequirePackage{amsmath}
70 \RequirePackage{amssymb}
71 \RequirePackage{amsthm}
72 \RequirePackage{wasysym}
73 \RequirePackage{bm}
74 \RequirePackage{upgreek}
75 \RequirePackage{graphicx}
76 \RequirePackage{lastpage}
77 \RequirePackage{xifthen}
78 \RequirePackage{verbatim}
79 \RequirePackage{fancyhdr}
80 \RequirePackage{geometry}
81 \RequirePackage{calc}
82 \RequirePackage[UKenglish]{isodate} % use UK format for date
83 \cleanlookdateon % remove th,st, rd from date
84
```

3.3   Geometry Settings

```
85 %%%%%%%%%%%%%%%%%%%%%%%%%%%%
86 %% Geometry Settings
87 %%%%%%%%%%%%%%%%%%%%%%%%%%%%
88
89 \geometry{
90 headheight=10mm,
91 headsep=5mm,
92 bottom=25mm,
93 footskip=15mm,
94 left=30mm,
95 right=30mm,
96 marginparwidth=0mm,
97 marginparsep=0mm,
98 includemp
```

```
 99 }
100
```

3.4 Margin Notes

```
101 %%%%%%%%%%%%%%%%%%%%%%%%%%
102 %% Margin Notes
103 %%%%%%%%%%%%%%%%%%%%%%%%%%
104
105 \NewDocumentCommand{\marginnote}{m}{\marginpar{#1}}
106 \NewDocumentCommand{\marginnotes}{}{
107 \geometry{
108  marginparwidth=40mm,
109  marginparsep=5mm,
110  left=20mm,
111  right=15mm
112 }
113 }
114
```

3.5 Question Numbering

```
115 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%
116 %% Question Numbering
117 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%
118
119 \newcounter{question}
120 \newcounter{qpart}[question]
121 \newcounter{qsubpart}[qpart]
122 \renewcommand{\thequestion}{\arabic{question}}
123
```

3.6 Option Handling

```
124 %%%%%%%%%%%%%%%%%%%%%%%%%%%%
125 %% Option Handling
126 %%%%%%%%%%%%%%%%%%%%%%%%%%%%
127 % Define boolean flags
128 \newif\iftma@roman
129 \newif\iftma@usecleveref
130 \newif\iftma@usepdfbookmark
131 \newif\iftma@legacy
132
133 % Set default options
134 \tma@romanfalse          % Default numbering is 'alph'
135 \tma@useclevereffalse    % Default is not to use cleveref
136 \tma@usepdfbookmarkfalse % Default is not to use pdfbookmark
137 \tma@legacyfalse         % Default is not to use legacy definitions
138
139 % Define commands with default values
140 \renewcommand{\theqpart}{\alph{qpart}}
141 \renewcommand{\theqsubpart}{\roman{qsubpart}}
142 \NewDocumentCommand{\tma@crefname}{mmm}{\relax}
143 \NewDocumentCommand{\tma@stepcounter}{m}{\stepcounter{#1}}
144 \NewDocumentCommand{\tma@bookmark}{O{0}mm}{\relax}
145 \NewDocumentCommand{\tma@pageref}{m}{\pageref{#1}}
```

```
146
147 % Declare options
148 \DeclareOption{roman}{%
149  \tma@romantrue%
150 }
151
152 \DeclareOption{alph}{%
153  \tma@romanfalse%
154 }
155
156 \DeclareOption{cleveref}{%
157  \tma@useclevereftrue%
158 }
159
160 \DeclareOption{pdfbookmark}{%
161  \tma@usepdfbookmarktrue%
162 }
163
164 \DeclareOption{legacy}{%
165  \tma@legacytrue%
166 }
167
168 \DeclareOption*{%
169  \PackageWarning{tma}{Unknown option '\CurrentOption'}%
170 }
171
172 % Process options
173 \ProcessOptions\relax
174
```

3.7   Debugging Options

```
175 \typeout{**************** OPTION RESULTS **********}
176 \iftma@usepdfbookmark
177 \typeout{pdfbookmark is TRUE}
178 \else
179 \typeout{pdfbookmark is FALSE}
180 \fi
181 \iftma@roman
182 \typeout{roman is TRUE}
183 \else
184 \typeout{roman is FALSE}
185 \fi
186 \iftma@usecleveref
187 \typeout{cleveref is TRUE}
188 \else
189 \typeout{cleveref is FALSE}
190 \fi
191 \iftma@legacy
192 \typeout{legacy is TRUE}
193 \else
194 \typeout{legacy is FALSE}
195 \fi
196 \typeout{************* END OPTION RESULTS **********}
197
```

3.8 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}{%
244  \pdfbookmark[#1]{#2}{#3}%
245 }
246 \fi
247
248 \setquestionstring{Q}
249
```

3.9   Question Environment

```
250 %%%%%%%%%%%%%%%%%%%%%%%%%%%%
251 %% Question Environment
252 %%%%%%%%%%%%%%%%%%%%%%%%%%%%
253
254 % Set up cref names if cleveref is used
255 \iftma@usecleveref
256 \tma@crefname{question}{question}{questions}
257 \tma@crefname{qpart}{part}{parts}
258 \tma@crefname{qsubpart}{section}{sections}
259 \fi
260
261 \NewDocumentEnvironment{question}{O{0}}{%
262 \ifthenelse{#1>0}{\setcounter{question}{#1-1}}{\relax}%
263 \tma@stepcounter{question}%
264 \tma@bookmark{Question \thequestion}%
265  {question\thequestion}%
266 \makebox[0em][r]{\large{\tma@questionstring~\thequestion\hspace{0.3em}}}\par%
267 }{%
268 \par \vspace{3em}%
269 }
270
271 \NewDocumentCommand{\qpart}{O{0}}{%
272 \ifthenelse{#1>0}{\setcounter{qpart}{#1-1}}{\relax}%
273 \tma@stepcounter{qpart}%
274 \tma@bookmark[1]{\thequestion.\theqpart}%
275  {qpart.\thequestion.\theqpart}%
276 \par%
277 \makebox[0pt][r]{\large{(\theqpart)\hspace{1.5em} }}%
278 }
279
280 \NewDocumentCommand{\qsubpart}{O{0}}{%
281 \ifthenelse{#1>0}{\setcounter{qsubpart}{#1-1}}{\relax}%
282 \tma@stepcounter{qsubpart}%
283 \tma@bookmark[2]{\thequestion.\theqpart.\theqsubpart}%
284  {qsubpart.\thequestion.\theqpart.\theqsubpart}%
285 \ifthenelse{\value{qsubpart}>1}%
286 {\par}{}%
287 \hspace{-2em}\makebox[2em][l]{\large{(\theqsubpart)}}%
288 }
289
```

3.10   Mathematical commands

```
290 %%%%%%%%%%%%%%%%%%%%%%%%%%%%
291 %% Mathematical Commands
292 %%%%%%%%%%%%%%%%%%%%%%%%%%%%
293
294 %% Differential Operators
295 \NewDocumentCommand{\dd}{}{\ensuremath{\mathop{}\!\mathrm{d}}}
296 \NewDocumentCommand{\e}{}{\ensuremath{\mathrm{e}}}
297 \NewDocumentCommand{\ii}{}{\ensuremath{\mathrm{i}}}
298
299 %% Number Sets
```

```latex
300 \NewDocumentCommand{\N}{}{\ensuremath{\mathbb{N}}}
301 \NewDocumentCommand{\Z}{}{\ensuremath{\mathbb{Z}}}
302 \NewDocumentCommand{\Q}{}{\ensuremath{\mathbb{Q}}}
303 \NewDocumentCommand{\R}{}{\ensuremath{\mathbb{R}}}
304 \NewDocumentCommand{\Complex}{}{%
305  \ensuremath{\mathbb{C}}} % Changed from \C to \Complex
306 \NewDocumentCommand{\Rr}{}{\ensuremath{\mathcal{R}}}
307
308 %% Vector Notation
309 \NewDocumentCommand{\vect}{m}{%
310  \ensuremath{\overrightarrow{#1}}} % Changed from \vec to \vect
311 \NewDocumentCommand{\ve}{m}{\ensuremath{\textbf{#1}}}
312
313 %% Superscript Notations
314 \NewDocumentCommand{\st}{}{\textsuperscript{st}}
315 \NewDocumentCommand{\nd}{}{\textsuperscript{nd}}
316 \NewDocumentCommand{\rd}{}{\textsuperscript{rd}}
317 \NewDocumentCommand{\nth}{}{\textsuperscript{th}}
318
319 % Additional Symbols
320 \NewDocumentCommand{\rect}{}{\ensuremath{\sqsubset\!\!\sqsupset}}
321
322 %% Combinatorial Notations
323 \NewDocumentCommand{\comb}{mm}{\ensuremath{{}^{#1}C_{#2}}}
324 \NewDocumentCommand{\perm}{mm}{\ensuremath{{}^{#1}P_{#2}}}
325
326 %% Mathematical Operators
327 \DeclareMathOperator{\re}{Re}
328 \DeclareMathOperator{\im}{Im}
329 \DeclareMathOperator{\Log}{Log}
330 \DeclareMathOperator{\Arg}{Arg}
331 \DeclareMathOperator{\Wnd}{Wnd}
332 \DeclareMathOperator{\Res}{Res}
333 \DeclareMathOperator{\Ker}{Ker}
334 \DeclareMathOperator{\Orb}{Orb}
335 \DeclareMathOperator{\Stab}{Stab}
336 \DeclareMathOperator{\Fix}{Fix}
337
338 %% Derivatives
339 \NewDocumentCommand{\deriv}{mm}{%
340  \frac{\mathrm{d}#1}{\mathrm{d}#2}}
341 \NewDocumentCommand{\pderiv}{mm}{%
342  \frac{\partial #1}{\partial #2}}
343 \NewDocumentCommand{\psderiv}{mmm}{%
344  \frac{\partial^2 #1}{\partial #2 \partial #3}}
345
346 % Legacy Definitions
347 \iftma@legacy
348 % Redefine \vec to old definition
349 \RenewDocumentCommand{\vec}{m}{\ensuremath{\overrightarrow{#1}}}
350 % Redefine \C to old definition
351 \ProvideDocumentCommand{\C}{}{\ensuremath{\mathbb{C}}}
352 \RenewDocumentCommand{\C}{}{\ensuremath{\mathbb{C}}}
353 \fi
```

354

3.11   Theorem Environment

```
355 %%%%%%%%%%%%%%%%%%%%%%%%%%%%
356 %% Theorem Environment
357 %%%%%%%%%%%%%%%%%%%%%%%%%%%%
358
359 \newtheorem{lemma}{Lemma}
360 \newtheorem{theorem}{Theorem}
361 % Define \blacksmiley without loading wasysym
362 \ProvideDocumentCommand{\blacksmiley}{}{%
363  \ensuremath{\unicode{263B}}} % Unicode for blacksmiley emoji
364 \RenewDocumentCommand{\qedsymbol}{}{\blacksmiley}
365
```

3.12   Miscellaneous Settings

```
366 %%%%%%%%%%%%%%%%%%%%%%%%%%%%
367 %% Miscellaneous Settings
368 %%%%%%%%%%%%%%%%%%%%%%%%%%%%
369
370 \RenewDocumentCommand{\thefootnote}{}{\fnsymbol{footnote}}
371 \numberwithin{equation}{question}
372 \setlength{\parindent}{0pt}
373 \setlength{\parskip}{2ex plus 0.3ex minus 0.2ex}
374
```

3.13   Header and Footer Settings

```
375 %%%%%%%%%%%%%%%%%%%%%%%%%%%%
376 %% Header and Footer Settings
377 %%%%%%%%%%%%%%%%%%%%%%%%%%%%
378
379 \pagestyle{fancy}
380 \fancyhf{} % Clear all headers and footers
381 \fancyhead[L]{\textrm{\name\ \pin}}
382 \fancyhead[C]{\textrm{\course\ TMA-\tma}}
383 \fancyhead[R]{\textrm{Page \thepage\ of \tma@pageref{LastPage}}}
384 \RenewDocumentCommand{\headrulewidth}{}{0pt} % Remove header rule
385
386 %%%%%%%%%%%%%%%%%%%%%%%%%%%%
387 %% End of Package
388 %%%%%%%%%%%%%%%%%%%%%%%%%%%%
389
390 \endinput
```