

# 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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## 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
```

(several times)

The file **tma.sty** should be placed in an appropriate location within the **T<sub>E</sub>X** 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 **L<sup>A</sup>T<sub>E</sub>X** 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:

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

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

`\mypin` 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.

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 `\qpart`, 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}[\langle question number \rangle]
:
\qpart[\langle part number \rangle]
:
\qsubpart[\langle sub-part number \rangle]
:
\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.

These commands are created in such a manner that they will work correctly in both text and maths modes.

**\dd Differential operators** The general advise for most OU modules is to use an upright letter ‘d’ when specifying differential variables, thus `\dd` is provided to allow simple accomodation of this. Similarly, Euler’s number and the imaginary unit representation of  $\sqrt{-1}$  are both usually given upright letters of ‘e’, (`\e`), and ‘i’, (`\ii`), respectively.

---

#### Example 1: Differential

---

*Code:*

In display mode, compare `\dd\` with `$d$`:

```

\[
\frac{\dd^2 y}{\dd x^2} + x \frac{\dd y}{\dd x} + y = 2 \sin(x) \\\
]

```

and in line mode `$\e^{\ii x} = \cos(x) + \ii \sin(x)$`

*Result:*

In display mode, compare `d` with `d`:

$$\frac{d^2 y}{dx^2} + x \frac{dy}{dx} + y = 2 \sin(x)$$

and in line mode `eix = cos(x) + i sin(x)`

---

**Number sets** Standard ‘black-board’ fonts are used to indicate a number of frequently designated groups of numbers.

<code>\N</code>	<code>\N</code> represents all natural numbers;
<code>\Z</code>	<code>\Z</code> represents all integers;
<code>\Q</code>	<code>\Q</code> represents all rational numbers;
<code>\R</code>	<code>\R</code> represents all real numbers; and
<code>\Complex</code>	<code>\Complex</code> represents all complex numbers.

---

**Example 2: Number sets**


---

*Code:*

```
The relationship between number sets:
\begin{itemize}
\item \mathbb{N} (Natural numbers) \subseteq \mathbb{Z} (Integers);
      every natural number is also an integer.
\item \mathbb{Z} (Integers) \subseteq \mathbb{Q} (Rational numbers);
      every integer is also a rational number.
\item \mathbb{Q} (Rational numbers) \subseteq \mathbb{R} (Real
      numbers); every rational number is also a real
      number.
\item \mathbb{C} (Complex numbers) \supseteq \mathbb{R} (Real
      number); complex numbers include real numbers as
      a subset, since they can be represented by
       $a+ii\ b$  where  $a$  and  $b$  are real numbers.
\end{itemize}
```

*Result:*

The relationship between number sets:

- $\mathbb{N}$  (Natural numbers)  $\subseteq \mathbb{Z}$  (Integers); every natural number is also an integer.
- $\mathbb{Z}$  (Integers)  $\subseteq \mathbb{Q}$  (Rational numbers); every integer is also a rational number.
- $\mathbb{Q}$  (Rational numbers)  $\subseteq \mathbb{R}$  (Real numbers); every rational number is also a real number.
- $\mathbb{C}$  (Complex numbers)  $\supseteq \mathbb{R}$  (Real number); complex numbers include real numbers as a subset, since they can be represented by  $a + ib$  where  $a$  and  $b$  are real numbers.

\vect  
\ve

**Vector notation** Two different vector representations are typically used on OU modules, there is the two, or more, letter with an over arrow version given with `\vect`; and the emboldened upright letter version `\ve`—the latter is commonly handwritten as an underlined letter.

---

**Example 3: Vectors**


---

*Code:*

```
Given a point  $A$  at the co-ordinate  $(6, 3)$  and a
point  $B$  at the co-ordinate  $(-4, 8)$ , the vector
 $\vect{AB}$  has a gradient of  $\frac{8-3}{-4-6} =$ 
 $\frac{5}{-10} = -\frac{1}{2}$ 
The standard unit vectors are  $\ve{i}$  and  $\ve{j}$ .
They are usually at right angles to each other.
```

*Result:*

Given a point  $A$  at the co-ordinate  $(6, 3)$  and a point  $B$  at the co-ordinate  $(-4, 8)$ , the vector  $\overrightarrow{AB}$  has a gradient of  $\frac{8-3}{-4-6} = \frac{5}{-10} = -\frac{1}{2}$  The standard unit vectors are  $\mathbf{i}$  and  $\mathbf{j}$ . They are usually at right angles to each other.

---

**\st** **Ordinal indicators** The use of ordinal indicators is not specific to OU modules, but frequently is a useful element that is just inconvenient to produce.

**\nd**

**\rd**

**\nth** So the standard four English ordinals are provided `\st`, `\nd`, `\rd`, and `\nth`, e.g. 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup>.

Note that the last ordinal is `\nth` not `\th`, the latter produces a thorn character, þ, and that only works if you have other than the default 7-bit font encoding (OT1).

**\rect** **Additional symbols** `\rect`,  $\square$ , is defined particularly for the use of M208 people although others may find it useful.

**Combinatorial notations** There are two combinatorial forms that are commonly used in OU modules, the combination selecting  $r$  out of a total of  $n$  items where order does not matter, and the permutations of  $r$  out of  $n$  items where order matters.

**\comb**  $\{ \langle n \rangle \} \{ \langle r \rangle \}$ . This is equivalent to

$${}^nC_r = \frac{n!}{r!(n-r)!}$$

**\perm**  $\{ \langle n \rangle \} \{ \langle r \rangle \}$ . This is equivalent to

$${}^nP_r = \frac{n!}{(n-r)!}$$

**Mathematical operators** Additional mathematical operators are defined, again for convenience of entry.

<b>\re</b>	• <code>\re</code> $\mapsto$ Re
<b>\im</b>	• <code>\im</code> $\mapsto$ Im
<b>\Log</b>	• <code>\Log</code> $\mapsto$ Log
<b>\Arg</b>	• <code>\Arg</code> $\mapsto$ Arg
<b>\Wnd</b>	• <code>\Wnd</code> $\mapsto$ Wnd
<b>\Res</b>	• <code>\Res</code> $\mapsto$ Res
<b>\Ker</b>	• <code>\Ker</code> $\mapsto$ Ker
<b>\Orb</b>	• <code>\Orb</code> $\mapsto$ Orb
<b>\Stab</b>	• <code>\Stab</code> $\mapsto$ Stab
<b>\Fix</b>	• <code>\Fix</code> $\mapsto$ Fix

**Derivatives** There are three derivative forms defined specifically for speeding calculus entry and accuracy. One used the  $dx$  form and two use the partial,  $\partial x$ , form.

<b>\deriv</b>	• <code>\deriv</code> $\{ \langle y \rangle \} \{ \langle x \rangle \} \mapsto \frac{dy}{dx}$
<b>\pderiv</b>	• <code>\pderiv</code> $\{ \langle y \rangle \} \{ \langle x \rangle \} \mapsto \frac{\partial y}{\partial x}$
<b>\psderiv</b>	• <code>\psderiv</code> $\{ \langle y \rangle \} \{ \langle x \rangle \} \{ \langle z \rangle \} \mapsto \frac{\partial^2 y}{\partial x \partial z}$

## 4 Implementation

```

1 %% tma.sty
2 %% Copyright 2025 G. I. Riley <geoffr@adaso.com>
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 Geoff 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 was 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 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"

```

### 4.1 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

```

## 4.2 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

```

### 4.3 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

```

### 4.4 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

```

### 4.5 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

## 4.6 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}{0{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

```

## 4.7 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
198

```

## 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[pdftencoding=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}{0{0} +m +m}{%
244 \pdfbookmark[#1]{#2}{#3}%
245 }
246 \fi
247
248 \setquestionstring{Q}
249

```

#### 4.9 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}{0{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}}}\pa
267 }{%
268 \par \vspace{3em}%
269 }
270
271 \NewDocumentCommand{\qpart}{0{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}{0{0}}{%
281 \ifthenelse{#1>0}{\setcounter{qsubpart}{#1-1}}{\relax}%
282 \tma@stepcounter{qsubpart}%
283 \tma@bookmark[2]{\thequestion.\thepart.\theqsubpart}%
284 {qsubpart.\thequestion.\thepart.\theqsubpart}%
285 \ifthenelse{\value{qsubpart}>1}%
286 {\par}{}%
287 \hspace{-2em}\makebox[2em][1]{\large{(\theqsubpart)}}%
288 }
289

```

#### 4.10 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
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 %% Ordinal Indicators
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{\dd{#1}}{\dd{#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

```

#### 4.11 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

```

#### 4.12 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

```

#### 4.13 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

```

## Change History

v1.12	General: Standardized package name to 'tma' to make it compatible with CTAN. Avoided redefining standard L <sup>A</sup> T <sub>E</sub> X commands. Consolidated geometry settings. Adjusted loading order of packages. Improved code readability and comments. Added 'legacy' option to allow old definitions of <code>\vec</code> and <code>\C</code> . . . . .	footer. . . . .	8
v1.13	General: Arranged for <code>\qsubpart</code> to go on the same line as the <code>\qpart</code> when there is no intervening text <code>\qsubpart</code> indents further than <code>\qpart</code> . . . . .	v1.16	General: Added File Properties to pdf files using the hyperref setup system when in pdfbookmark mode. . . . .
v1.14	General: Allow replacement of Question marker tag using <code>\setquestionstring</code> . References with cleveref not working. Replaced my attempts at keeping <code>\qpart</code> and <code>\qsubpart</code> on the same line with Steve Mayers contribution. . . . .	v1.17	General: Rewritten with L <sup>A</sup> T <sub>E</sub> X3 syntax from the 'xparse' package to make commands less fragile. Finally, I got the alignment of part and subpart numbering to line up correctly. . . . .
v1.15	General: Define <code>\setdate</code> and <code>\thedata</code> to allow the header date to be used within the document, eg header and	v1.18	General: PDF metadata doesn't set correctly so I have removed it: the cause is an incompatibility between L <sup>A</sup> T <sub>E</sub> X unicode and the PDF restricted character allowance. . . . .
		v1.19	General: PDF metadata (apparently) was solved with help from Steve Mayers; all down to the use of commands as string containers. New (L <sup>A</sup> T <sub>E</sub> X3) commands are robust and fail to expand within the context of the metadata and bookmarks; old (L <sup>A</sup> T <sub>E</sub> X2e) commands are fragile and correctly expanded. I have a mix of old commands and new variables now. . . . .



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