

# The ou-tma Package\*

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## Abstract

The `ou-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 `ou-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 (OU).

## 2 Compiling and installing ou-tma

To compile the `ou-tma` package:

```
Enter ⇒ pdflatex tma.ins
```

To compile the `ou-tma` documentation:

```
Enter ⇒ pdflatex ou-tma.dtx
```

(several times)

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

```
Enter ⇒ makeindex -s gind.ist ou-tma
```

```
Enter ⇒ pdflatex ou-tma.dtx
```

(several times)

The file `ou-tma.sty` should be placed in an appropriate location within the  $\text{\TeX}$  directory structure. For example in a directory such as `tex/latex/tma`.

## 3 Usage

To use the `ou-tma` package, in its most basic form, it should be included in the preamble of your  $\text{\LaTeX}$  document:

```

\documentclass[a4paper,11pt]{article}
\usepackage{ou-tma}
:
\begin{document}
:
\end{document}

```

### 3.1 Options

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

```
\usepackage[<option,...>]{ou-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 `ou-tma` package provides several valuable macros and environments, most are 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 `\myname` 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 OU allocates a Personal Identification Number (or PIN) as a `\mypin` 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. This is distinct from the OUCU, or OU Computer User identifier that is used to log in to the OU website. Once the personal identification has been done, the module

being worked needs to be declared, the course code of your module should be given `\mycourse` 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 `\setdate` 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 answer should be placed in a `question` environment. The question number is printed across the margin, preceded by the question string which defaults to ‘Q’ but may be redefined by use of the command `\setquestionstring` `\setquestionstring{<required question number introduction>}`. The question number itself is automatically incremented unless one is specified in the optional parameter. Since the question is presented as an environment, it may be 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 `ou-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.

There are occasions that the parts of questions may be further divided into sub-`\qsubpart` 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 are mostly as proscribed by the various standards bodies too, for reference see “Quantities and units - Part 2: Mathematics” ISO 80000-2:2019\*

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.

*Remember that it is always the exception that proves the rule: follow the the module guidebook for the course being completed.*

---

#### 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`:

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

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

---

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

---

\* Available from British Standards Online as BS EN ISO-2:2019 (ISBN 978 0 539 23108 3), The European Standards Agency and The International Standard Organisation. All are purchasable publications.

---

<code>\N</code>	<code>\N</code> : $\mathbb{N}$ represents all natural numbers;
<code>\Z</code>	<code>\Z</code> : $\mathbb{Z}$ represents all integers;
<code>\Q</code>	<code>\Q</code> : $\mathbb{Q}$ represents all rational numbers;
<code>\R</code>	<code>\R</code> : $\mathbb{R}$ represents all real numbers; and
<code>\Complex</code>	<code>\Complex</code> : $\mathbb{C}$ represents all complex numbers.

---

### Example 2: Number sets

---

*Code:*

```
The relationship between number sets:
\begin{itemize}
\item \N\ (Natural numbers)  $\subseteq \Z$  (Integers);
    every natural number is also an integer.
\item \Z\ (Integers)  $\subseteq \Q$  (Rational numbers);
    every integer is also a rational number.
\item \Q\ (Rational numbers)  $\subseteq \R$  (Real
    numbers); every rational number is also a real
    number.
\item \Complex\ (Complex numbers)  $\supseteq \R$  (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` **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  $\vec{AB}$  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.

*Result:*

Given a point  $A$  at the co-ordinate  $(6, 3)$  and a point  $B$  at the co-ordinate  $(-4, 8)$ , the vector  $\vec{AB}$  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.

**\rd** 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>.

**\nth** 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).

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

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

**\perm** **\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.

**\re** **\re:**  $\mapsto \text{Re}$

**\im** **\im:**  $\mapsto \text{Im}$

**\Log** **\Log:**  $\mapsto \text{Log}$

**\Arg** **\Arg:**  $\mapsto \text{Arg}$

**\Wnd** **\Wnd:**  $\mapsto \text{Wnd}$

**\Res** **\Res:**  $\mapsto \text{Res}$

---

<code>\Ker</code>	<code>\Ker: \mapsto Ker</code>
<code>\Orb</code>	<code>\Orb: \mapsto Orb</code>
<code>\Stab</code>	<code>\Stab: \mapsto Stab</code>
<code>\Fix</code>	<code>\Fix: \mapsto Fix</code>

**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.

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

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

**Legacy elements** There are a couple of macros which become enabled when using the `legacy` option. These are now deprecated and may be removed from a future version. There are name clashes with standard L<sup>A</sup>T<sub>E</sub>X commands, so please be aware of this if used.

<code>\C</code>	<code>\C: is the original version of \Complex</code>
<code>\vec</code>	<code>\vec: is the original version of \vect</code>

## 4 Implementation

```

1 %% ou-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,
17 %% students, lecturers and staff of the Open University. It was created
18 %% by the efforts of many who are now or have been connected with the
19 %% Open University Students Association. No acknowledgement is
20 %% _required_ for using this package within the production of a _Tutor
21 %% Marked Assessment._

```



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### 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]{ou-tma}
```

Before getting into the main package, it is necessary to ensure that the L<sup>A</sup>T<sub>E</sub>X3 extensions are loaded. Most modern versions of the L<sup>A</sup>T<sub>E</sub>X core have this rolled in as standard, but as a belt and braces approach, inclusion here does no harm.

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

## 4.1 Package Initialisation

We are starting off using the `\ExplSyntaxOn` command to enable the L<sup>A</sup>T<sub>E</sub>X3 extensions before declaring a set of ‘constants’ that will be used by our package. Working with the established conventions the constants are declared as variables are named to reflect their ownership and function. These are all declared as ‘token lists’ so that they may, effectively, hold string elements. Make the underscore character a letter!

```
g_tma_constant_name g_tma_constant_name: holds the students personal name
```

```
(Var)
```

```
g_tma_constant_tma g_tma_constant_tma: holds the number of the TMA being answered
```

```
(Var)
```

```
g_tma_constant_course g_tma_constant_course: holds the OU course code for the module being studied
```

```
(Var)
```

```
g_tma_constant_pin g_tma_constant_pin: holds the students personal identification number
```

```
(Var)
```

```
g_tma_constant_thedate g_tma_constant_thedate: holds the date to be printed on the front page of the
```

```
TMA
```

```
(Var)
```

```
23 % %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

```
24 %% Package Initialization
```

```
25 % %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

```
26 \ExplSyntaxOn
```

```

27 \tl_new:N \g_tma_constant_name
28 \tl_new:N \g_tma_constant_tma
29 \tl_new:N \g_tma_constant_course
30 \tl_new:N \g_tma_constant_pin
31 \tl_new:N \g_tma_constant_thedate

```

These ‘constants’ are given initial generic values.

```

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}

```

Then commands are provided to retrieve the values when required.

`\name \name:` returns the students name

`\tma \tma:` returns the working TMA number

`\course \course:` returns the OU course reference

`\pin \pin:` returns the students personal identification number

`\thedate \thedate:` returns the date to be printed on the title page of the TMA

```

37 \newcommand{\name}{\g_tma_constant_name}
38 \newcommand{\tma}{\g_tma_constant_tma}
39 \newcommand{\course}{\g_tma_constant_course}
40 \newcommand{\pin}{\g_tma_constant_pin}
41 \newcommand{\thedate}{\g_tma_constant_thedate}

```

Finally, macros are provided to set the values of the ‘constants’: these should only be used within the preamble. Use within the body of the text is unpredictable.

`\myname \myname:` `{\langle name \rangle}` Set the students name

`\mytma \mytma:` `{\langle TMA number \rangle}` Set the TMA number

`\mycourse \mycourse:` `{\langle course code \rangle}` Set the OU course code for the module

`\mypin \mypin:` `{\langle pin \rangle}` Set the students personal identification number

`\setdate \setdate:` `{\langle the date \rangle}` Set the required date to display on the title page, default is the date of report generation

```

42 \NewDocumentCommand{\myname}{m}{%
43 \tl_gset:Nn \g_tma_constant_name{#1}}
44 \NewDocumentCommand{\mytma}{m}{%
45 \tl_gset:Nn \g_tma_constant_tma{#1}}
46 \NewDocumentCommand{\mycourse}{m}{%
47 \tl_gset:Nn \g_tma_constant_course{#1}}

```

```

48 \NewDocumentCommand{\mypin}{m}{%
49 \tl_gset:Nn \g_tma_constant_pin{#1}}
50 \NewDocumentCommand{\setdate}{m}{%
51 \date{#1}\tl_gset:Nn \g_tma_constant_thedate{#1}}

```

That's the end of the L<sup>A</sup>T<sub>E</sub>X3 extensions requiring the extension switch, so it can be turned off.

```
52 \ExplSyntaxOff
```

Set the `\title` and `\author` ready for use by the `\maketitle` macro at the start of the main document. They use the constants defined above so that changes are automatically reflected. They may be redefined by the user if required.

```

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

```

In order to allow the question introduction string to be modified, a general L<sup>A</sup>T<sub>E</sub>X string is created along with a macro to set it.

`\tma@questionstring \tma@questionstring`: Hold the string to be printed before the question number, the default is 'Q'.

`\setquestionstring \setquestionstring: {<string>}` Set the string to precede the question number

```

55 \NewDocumentCommand{\tma@questionstring}{}{\relax}
56 \NewDocumentCommand{\setquestionstring}{m}{%
57 \RenewDocumentCommand{\tma@questionstring}{}{#1}}

```

Set the default date to 'today'.

```
58 \setdate{\today}
```

## 4.2 Package Loading

Here we load the useful packages that have proven their worth for OU students over the years. Many have properties that are utilised by the rest of the `ou-tma` package.

```

59 % %%%%%%%%%%%%%%%
60 %% Package Loading
61 % %%%%%%%%%%%%%%%
62
63 \RequirePackage{amsmath}
64 \RequirePackage{amssymb}
65 \RequirePackage{amsthm}
66 \RequirePackage{wasysym}
67 \RequirePackage{bm}
68 \RequirePackage{upgreek}
69 \RequirePackage{graphicx}
70 \RequirePackage{lastpage}
71 \RequirePackage{xifthen}

```

```

72 \RequirePackage{verbatim}
73 \RequirePackage{fancyhdr}
74 \RequirePackage{geometry}
75 \RequirePackage{calc}
76 \RequirePackage[UKenglish]{isodate} % use UK format for date
77 \cleanlookdateon % remove th,st, rd from date
78

```

### 4.3 Geometry Settings

An important part of TMA answering is providing a consistent output, to this end the following page geometry has been brought together as a compromise suitable for most modules.

```

79 % %%%%%%%%%%%%%%%
80 %% Geometry Settings
81 % %%%%%%%%%%%%%%%
82
83 \geometry{
84   headheight=10mm,
85   headsep=5mm,
86   bottom=25mm,
87   footskip=15mm,
88   left=30mm,
89   right=30mm,
90   marginparwidth=0mm,
91   marginparsep=0mm,
92   includemp
93 }

```

### 4.4 Margin Notes

By default, no margin notes are assumed to be required, however, if one is wanted, `\marginnotes` the `\marginnotes` command will set up the side margin ready to accept notes using `\marginnote` the `\marginnote{\textit{note}}` command.

```

94 % %%%%%%%%%%%%%%%
95 %% Margin Notes
96 % %%%%%%%%%%%%%%%
97
98 \NewDocumentCommand{\marginnote}{m}{\marginpar{#1}}
99 \NewDocumentCommand{\marginnotes}{-}{
100   \geometry{
101     marginparwidth=40mm,
102     marginparsep=5mm,
103     left=20mm,
104     right=15mm
105   }
106 }

```

## 4.5 Question Numbering

We set up three counters to keep track of the question number along with associated parts and subparts.

**question** (*Ctr*) **question:** Holds the current question number, when a new question is started this value is used unless one is provided, in either case the used value is incremented as saved back here. When used, the `\qpart` is automatically reset so that the first part will be part 1.

**qpart** (*Ctr*) **qpart:** Holds the current part number as a numeric value, as with the question number this may be overridden and is incremented after being used. When used, the `\qsubpart` is automatically reset so that the first subpart will be sub-part 1.

**qsubpart** (*Ctr*) **qsubpart:** Holds the current sub-part number as a numeric value, again, the value may be overridden and is incremented after being used.

```
107 % %%%%%%%%%%
108 %% Question Numbering
109 % %%%%%%%%%%
110
111 \newcounter{question}
112 \newcounter{qpart}[question]
113 \newcounter{qsubpart}[qpart]
```

The question number is set to print as arabic digits,

```
114 \renewcommand{\thequestion}{\arabic{question}}
```

## 4.6 Option Handling

In order to handle the incoming options for the `ou-tma` package, we create a set of four new boolean tokens.

**tma@roman** (*bool*) **tma@roman:** False indicates ‘alph’ numbering, true indicates ‘roman’ numbering of parts and subpart.

**tma@usecleveref** (*bool*) **tma@usecleveref:** True indicates that the `cleveref` package is requested.

**tma@usepdfbookmark** **tma@usepdfbookmark:** True indicated that the `pdfbookmark` package is requested.  
(*bool*)

**tma@legacy** (*bool*) **tma@legacy:** True indicted that the commands `\Complex` and `\vect` will be redefined to the legacy commands `\C` and `\vec`.

```
115 % %%%%%%%%%%
116 %% Option Handling
117 % %%%%%%%%%%
118 % Define boolean flags
```

```

119 \newif\iftma@roman
120 \newif\iftma@usecleveref
121 \newif\iftma@usepdfbookmark
122 \newif\iftma@legacy
123
124 % Set default options
125 \tma@romanfalse           % Default numbering is 'alph'
126 \tma@useclevereffalse    % Default is not to use cleveref
127 \tma@usepdfbookmarkfalse % Default is not to use pdfbookmark
128 \tma@legacyfalse         % Default is not to use legacy definitions

```

We now set up the default states and commands for the ou-tma package operation.

`\theqpart \theqpart:` returns the current question part number as either an alpha or roman index.

`\theqsubpart \theqsubpart:` returns the current question subpart number as either a roman or an alpha index.

`\tma@crefname \tma@crefname: {\langle label type \rangle}{\langle singular name \rangle}{\langle plural name \rangle}` Declares a label with singular and plural spellings for the `cleveref` package.

`\tma@stepcounter \tma@stepcounter: {\langle counter name \rangle}` Increments the named counter by one.

`\tma@bookmark \tma@bookmark: [\langle level \rangle]{\langle text \rangle}{\langle name \rangle}` The level is optional, numerical, the default is zero, the top level. The text is what will appear in the bookmark panel, and the name is what may be used as a reference to the location from other parts of the document.

`\tma@pageref \tma@pageref: {\langle name \rangle}` returns the page number, if known, that contains the bookmark with the label name.

```

129 % Define commands with default values
130 \renewcommand{\theqpart}{\alph{qpart}}
131 \renewcommand{\theqsubpart}{\roman{qsubpart}}
132 \NewDocumentCommand{\tma@crefname}{mmm}{\relax}
133 \NewDocumentCommand{\tma@stepcounter}{m}{\stepcounter{#1}}
134 \NewDocumentCommand{\tma@bookmark}{0{0}mm}{\relax}
135 \NewDocumentCommand{\tma@pageref}{m}{\pageref{#1}}

```

Declare each of the valid options for the option processing system. In each case, the action is to set the appropriate boolean to true or false.

```

136 % Declare options
137 \DeclareOption{roman}{%
138   \tma@romantrue%
139 }
140 \DeclareOption{alph}{%
141   \tma@romanfalse%
142 }
143 \DeclareOption{cleveref}{%
144   \tma@useclevereftrue%

```

```

145 }
146 \DeclareOption{pdfbookmark}{%
147   \tma@usepdfbookmarktrue%
148 }
149 \DeclareOption{legacy}{%
150   \tma@legacytrue%
151 }
152 \DeclareOption*{%
153   \PackageWarning{ou-tma}{Unknown option '\CurrentOption'}%
154 }

```

Go ahead, process those options!

```

155 % Process options
156 \ProcessOptions\relax

```

## 4.7 Debugging Options

A short section of code outputting to the log the state of the four main options that may be passed to the ou-tma package.

```

157 \typeout{***** OPTION RESULTS *****}
158 \iftma@usepdfbookmark
159 \typeout{pdfbookmark is TRUE}
160 \else
161 \typeout{pdfbookmark is FALSE}
162 \fi
163 \iftma@roman
164 \typeout{roman is TRUE}
165 \else
166 \typeout{roman is FALSE}
167 \fi
168 \iftma@usecleveref
169 \typeout{cleveref is TRUE}
170 \else
171 \typeout{cleveref is FALSE}
172 \fi
173 \iftma@legacy
174 \typeout{legacy is TRUE}
175 \else
176 \typeout{legacy is FALSE}
177 \fi
178 \typeout{***** END OPTION RESULTS *****}

```

## 4.8 Package adjustments based on Options

```

179 % %%%%%%%%%%%
180 %% Set Up Package Based on Options
181 % %%%%%%%%%%%
182
183 % Set question numbering
184 \iftma@roman

```

---

```

185 \renewcommand{\theqpart}{\roman{qpart}}
186 \renewcommand{\theqsubpart}{\alph{qsubpart}}
187 \else
188 \renewcommand{\theqpart}{\alph{qpart}}
189 \renewcommand{\theqsubpart}{\roman{qsubpart}}
190 \fi
191 % Load hyperref if necessary
192 \iftma@usepdfbookmark
193 \AtBeginDocument{%
194   \hypersetup{%
195     colorlinks=true,%
196     linkcolor=blue,%
197     urlcolor=blue,%
198     pdfstartview=FitH,%
199     pdftitle={TMA~\tma}, %
200     pdfauthor={\name~-~\pin}, %
201     pdfkeywords={OUCU:~\pin, TMA~\tma}, %
202     pdfsubject=\course%
203   }%
204 }
205 \RequirePackage[pdfencoding=unicode,psdextra]{hyperref}
206 \fi
207
208 % Load cleveref if necessary
209 \iftma@usecleveref
210 % Ensure hyperref is loaded before cleveref
211 \@ifpackageloaded{hyperref}%
212 {}%
213 {\RequirePackage[pdfencoding=unicode,psdextra]{hyperref}}
214 \RequirePackage{cleveref}
215 % Redefine commands for cleveref
216 \RenewDocumentCommand{\tma@crefname}{mmm}{\crefname{#1}{#2}{#3}}
217 \RenewDocumentCommand{\tma@stepcounter}{m}{\refstepcounter{#1}}
218 \fi
219
220 % Redefine commands for pdfbookmark
221 \iftma@usepdfbookmark
222 \RenewDocumentCommand{\tma@pageref}{m}{\pageref*{#1}}
223 \RenewDocumentCommand{\tma@bookmark}{0{0} +m +m}{%
224   \pdfbookmark[#1]{#2}{#3}%
225 }
226 \fi
227
228 \setquestionstring{Q}
229

```

## 4.9 Question Environment

```

230 % %%%%%%%%%%%
231 %% Question Environment
232 % %%%%%%%%%%%
233
234 % Set up cref names if cleveref is used
235 \iftma@usecleveref
236 \tma@crefname{question}{question}{questions}
237 \tma@crefname{qpart}{part}{parts}

```



```

238 \tma@crefname{qsubpart}{section}{sections}
239 \fi
240
241 \NewDocumentEnvironment{question}{0{0}}{%
242   \ifthenelse{#1>0}{\setcounter{question}{#1-1}}{\relax}%
243   \tma@stepcounter{question}%
244   \tma@bookmark{Question \thequestion}%
245   {question\thequestion}%
246   \makebox[0em][r]{\large{\tma@questionstring~\thequestion%
247     \hspace{0.3em}}}\par%
248 }{%
249   \par \vspace{3em}%
250 }
251
252 \NewDocumentCommand{\qpart}{0{0}}{%
253   \ifthenelse{#1>0}{\setcounter{qpart}{#1-1}}{\relax}%
254   \tma@stepcounter{qpart}%
255   \tma@bookmark[1]{\thequestion.\theqpart}%
256   {qpart.\thequestion.\theqpart}%
257   \par%
258   \makebox[0pt][r]{\large{(\theqpart)\hspace{1.5em} }}%
259 }
260
261 \NewDocumentCommand{\qsubpart}{0{0}}{%
262   \ifthenelse{#1>0}{\setcounter{qsubpart}{#1-1}}{\relax}%
263   \tma@stepcounter{qsubpart}%
264   \tma@bookmark[2]{\thequestion.\theqpart.\theqsubpart}%
265   {qsubpart.\thequestion.\theqpart.\theqsubpart}%
266   \ifthenelse{\value{qsubpart}>1}%
267   {\par}{}%
268   \hspace{-2em}\makebox[2em][l]{\large{(\theqsubpart)}}%
269 }
270

```

## 4.10 Mathematical commands

```

271 % %%%%%%%%%%%%%%%
272 %% Mathematical Commands
273 % %%%%%%%%%%%%%%%
274
275 %% Differential Operators
276 \NewDocumentCommand{\dd}{}{\ensuremath{\mathop{}\!\mathrm{d}}}
277 \NewDocumentCommand{\e}{}{\ensuremath{\mathrm{e}}}
278 \NewDocumentCommand{\ii}{}{\ensuremath{\mathrm{i}}}
279
280 %% Number Sets
281 \NewDocumentCommand{\N}{}{\ensuremath{\mathbb{N}}}
282 \NewDocumentCommand{\Z}{}{\ensuremath{\mathbb{Z}}}
283 \NewDocumentCommand{\Q}{}{\ensuremath{\mathbb{Q}}}
284 \NewDocumentCommand{\R}{}{\ensuremath{\mathbb{R}}}
285 \NewDocumentCommand{\Complex}{}{%
286   \ensuremath{\mathbb{C}}} % Changed from \C to \Complex
287 \NewDocumentCommand{\Rr}{}{\ensuremath{\mathcal{R}}}
288
289 %% Vector Notation
290 \NewDocumentCommand{\vect}{m}{%

```

---

```

291 \ensuremath{\overrightarrow{#1}} % Changed from \vec to \vect
292 \NewDocumentCommand{\ve}{m}{\ensuremath{\textbf{#1}}}
293
294 %% Ordinal Indicators
295 \NewDocumentCommand{\st}{-}{\textsuperscript{st}}
296 \NewDocumentCommand{\nd}{-}{\textsuperscript{nd}}
297 \NewDocumentCommand{\rd}{-}{\textsuperscript{rd}}
298 \NewDocumentCommand{\nth}{-}{\textsuperscript{th}}
299
300 %% Additional Symbols
301 \NewDocumentCommand{\rect}{-}{\ensuremath{\sqsubset\!\!\sqsupset}}
302
303 %% Combinatorial Notations
304 \NewDocumentCommand{\comb}{mm}{\ensuremath{{}^{\#1}C_{\#2}}}
305 \NewDocumentCommand{\perm}{mm}{\ensuremath{{}^{\#1}P_{\#2}}}
306
307 %% Mathematical Operators
308 \DeclareMathOperator{\re}{Re}
309 \DeclareMathOperator{\im}{Im}
310 \DeclareMathOperator{\Log}{Log}
311 \DeclareMathOperator{\Arg}{Arg}
312 \DeclareMathOperator{\Wnd}{Wnd}
313 \DeclareMathOperator{\Res}{Res}
314 \DeclareMathOperator{\Ker}{Ker}
315 \DeclareMathOperator{\Orb}{Orb}
316 \DeclareMathOperator{\Stab}{Stab}
317 \DeclareMathOperator{\Fix}{Fix}
318
319 %% Derivatives
320 \NewDocumentCommand{\deriv}{mm}{%
321 \frac{\dd{#1}}{\dd{#2}}}
322 \NewDocumentCommand{\pderiv}{mm}{%
323 \frac{\partial #1}{\partial #2}}
324 \NewDocumentCommand{\psderiv}{mmm}{%
325 \frac{\partial^2 #1}{\partial #2 \partial #3}}
326
327 % Legacy Definitions
328 \iftma@legacy
329 % Redefine \vec to old definition
330 \RenewDocumentCommand{\vec}{m}{\ensuremath{\overrightarrow{#1}}}
331 % Redefine \C to old definition
332 \ProvideDocumentCommand{\C}{-}{\ensuremath{\mathbb{C}}}
333 \RenewDocumentCommand{\C}{-}{\ensuremath{\mathbb{C}}}
334 \fi
335

```

## 4.11 Theorem Environment

```

336 % %%%%%%%%%%%
337 %% Theorem Environment
338 % %%%%%%%%%%%
339
340 \newtheorem{lemma}{Lemma}
341 \newtheorem{theorem}{Theorem}
342 % Define \blacksmiley without loading wasysym
343 \ProvideDocumentCommand{\blacksmiley}{-}{%

```

```

344 \ensuremath{\unicode{263B}} % Unicode for blacksmiley emoji
345 \RenewDocumentCommand{\qedsymbol}{\blacksmiley}
346

```

## 4.12 Miscellaneous Settings

```

347 % %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
348 %% Miscellaneous Settings
349 % %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
350
351 \RenewDocumentCommand{\thefootnote}{\fnsymbol{footnote}}
352 \numberwithin{equation}{question}
353 \setlength{\parindent}{0pt}
354 \setlength{\parskip}{2ex plus 0.3ex minus 0.2ex}
355

```

## 4.13 Header and Footer Settings

```

356 % %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
357 %% Header and Footer Settings
358 % %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
359
360 \pagestyle{fancy}
361 \fancyhf{} % Clear all headers and footers
362 \fancyhead[L]{\textrm{\name\ pin}}
363 \fancyhead[C]{\textrm{\course\ TMA-tma}}
364 \fancyhead[R]{\textrm{Page \thepage\ of \tma@pageref{LastPage}}}
365 \RenewDocumentCommand{\headrulewidth}{\Opt} % Remove header rule
366
367 % %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
368 %% End of Package
369 % %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
370
371 \endinput

```

## Change History

- |   |   |
|---|---|
| <p>v1.12</p> <p>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>. . . 9</p> <p>v1.13</p> <p>General: Arranged for <code>\qsubpart</code> to go on the same line as the <code>\qpart</code> when there is no</p> | <p>intervening text <code>\qsubpart</code> indents further than <code>\qpart</code>. . . . 9</p> <p>v1.14</p> <p>General: Allow replacement of Question marker tag using <code>\setquestionstring</code>. References with <code>cleveref</code> not working. Replaced my attempts at keeping <code>\qpart</code> and <code>\qsubpart</code> on the same line with Steve Mayers contribution. . . . . 9</p> <p>v1.15</p> <p>General: Define <code>\setdate</code> and <code>\thedata</code> to allow the header date to be used within the</p> |
|---|---|

document, eg header and footer. <b>9</b>	containers. New (L <sup>A</sup> T <sub>E</sub> X3)
v1.16	commands are robust and fail to
General: Added File Properties to	expand within the context of the
pdf files using the hyperref setup	metadata and bookmarks; old
system when in pdfbookmark	(L <sup>A</sup> T <sub>E</sub> X2e) commands are fragile
mode. . . . . <b>9</b>	and correctly expanded. I have a
v1.17	mix of old commands and new
General: Rewritten with L <sup>A</sup> T <sub>E</sub> X3	variables now. . . . . <b>9</b>
syntax from the ‘xparse’ package	v1.20
to make commands less fragile.	General: Package name changed
Finally, I got the alignment of	from ‘tma’ to ‘ou-tma’ to become
part and subpart numbering to	a little more descriptive and to
line up correctly. . . . . <b>9</b>	abide by the minimum package
v1.18	name length suggested by CTAN. <b>9</b>
General: PDF metadata doesn’t set	v1.21
correctly so I have removed it:	General: Documentation error
the cause is an incompatibility	spotted and corrected in very
between L <sup>A</sup> T <sub>E</sub> X unicode and the	first example. A couple of other
PDF restricted character	occurrences also corrected in less
allowance. . . . . <b>9</b>	conspicuous places. . . . . <b>9</b>
v1.19	v1.21.1
General: PDF metadata	General: Typo notified just after
(apparently) was solved with	previous errors corrected. Minor
help from Steve Mayers; all down	error in <code>\setquestionstring</code>
to the use of commands as string	instead of <code>\setquestionstring</code> . <b>9</b>

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