# Preparing a Manuscript for the AMSTEXT Book Series

American Mathematical Society

2017/01/27 v0.996 beta AMSTEXT Author Class

# Contents

# Introduction

The `amstext-l` ("ell" for LaTeX, not "one") document class is intended for undergraduate textbooks and other instructional works. Since this is a new area for the AMS, the document class still lacks some features that will ultimately prove useful, or even essential. We intend to build in more features as they are proposed by authors of volumes in the series, aiming always for generality.

This brief document is intended to introduce features that are specific to `amstext-l`. It has been produced using `\documentclass{amstext-l}` and illustrates this style in practice. Features already present in `amsbook` (on which `amstext-l` is based) will not be reiterated in detail; please refer to the manuals for AMS document classes [**HANDBK**] and the `amsthm` package [**THM**] for that information.

## 1. Type sizes and styles

**1.1. Type sizes.** The default type size for `amstext-l` is 10pt—the size used for this introductory manual. This results from the command

```
\documentclass{amstext-l}
```

An 11pt option is available with

```
\documentclass[11pt]{amstext-l}
```

**1.2. Sectioning.** Experience with manuscripts prepared for this series demonstrates that section headings in the "usual" style do not stand out sufficiently well to be spotted easily among closely packed examples and exercises. For this reason, a sans serif font has been substituted for the more traditional serif form, and lower levels are indented to contrast with the predominantly flush left theorem-class headings. Chapter headings are also set in sans serif to complement the section heading style.

**1.2.1.** *Second-level sections.* Headings at this level are set in slanted sans serif type. Subsubsections are not by default listed in the table of contents.

## 2. Existing facilities for exercises

Some facilities that already exist in the basic `amsbook` document class are especially relevant for textbooks, but are not as well documented in [**HANDBK**] as they might be.

**2.1. Exercises grouped in a section.** The `xcb` environment is intended for exercises that are grouped in a separate section either at the end of a chapter or between other sections within a chapter. These sections are unnumbered. The environment requires one argument: the title of the section:

```
\begin{xcb}{Sample exercise section}
...
\end{xcb}
```

By default, the end of an `xcb` section is unmarked, but an end-of-section marker can be set by specifying the document-class option `[multixcb]`. This marker is most appropriate when `xcb` sections are interspersed among other sections. When no option is specified, the section heading, like all chapters and other section headings (numbered and unnumbered), is listed in the table of contents; when the option is specified, "Exercises" does not appear in the table of contents and the running heads are unaffected.

The sample exercise section below is set with the `[multixcb]` option.

Within an `xcb` section, the `enumerate` environment is used to number the exercises. The space allowed for exercise numbers assumes that no more than 99 exercises will be present in the section. However, the number of digits can be changed by redefining the `\xcbdigits` command:

```
\renewcommand{\xcbdigits}{999}
```

If the form of the exercise number is more elaborate, e.g., the numbering scheme is multi-level, or includes letters, a model of the longest one can be used instead:

```
\renewcommand{\xcbdigits}{99.m.99.}
```

Be sure to use the longest such instance that will occur in the relevant context. If the value of `\xcbdigits` is changed, the new value will remain in force unless it is changed again.

This command can be placed either in the preamble or directly before the line `\begin{xcb}`; it will have no effect if it is placed within the scope of the `xcb` environment.

---

### Sample exercise section

1. First exercise.

2. Second exercise.

3. Third exercise. Increase the number of the next one to show the alignment of the numbers.

12. An exercise with a two-digit number.

13. Another exercise showing that an exercise section can continue onto a new page.

---

In the (unlikely) event that an `xcb` section within a `[multixcb]` context ends at the bottom of a page, above a footnote with a rule preceding it, the page-wide component of the `xcb`-ending rule may be considered excessive. That rule can be reduced to just the thicker, narrower portion by issuing the command

    \shortxcbendrule

before the end of the affected group of exercises. This will suppress the full-width component of that single ending marker, and immediately be deactivated. The decision to make such an adjustment should be left to final cleanup, as other changes to the text may change the relative location of these elements.

**2.2. Individual exercises within main text.** If exercises are desired outside of an `xcb` block, it is recommended to set up an individual exercise environment, `xca`, as a theorem-class element:

    \theoremstyle{definition}

    \newtheorem{xca}{Exercise}[⟨*counter*⟩]

The `xca` environment is defined in the `amstext-1.template` file, but if you do not use that, you will need to define it yourself.

The following example of an `xca` exercise was input as

    \begin{xca}[Illustrative exercise]

    Study the input for this document and suggest improvements.

    \end{xca}

**Exercise 2.1** (Illustrative exercise)**.** Study the input for this document and suggest improvements.

---

**More sample exercises**

1. First exercise.
2. Second exercise.

---

## 3. Warning concerning an incompatible package

The `enumitem` package is a popular one, used to format the labels in an enumerated environment. Unfortunately, it disables the carefully formatted item listings in `xcb` environments, causing the indentation of the text to become ragged. For this reason, the `enumitem` should not be used with this document class.

# New Features

Several new environments and commands have been defined for `amstext-l`:

- a framed environment for highlighting important information, for example theorems;
- an "inclusion" environment for de-emphasizing material that is more advanced, or can be skipped over on first reading;
- a bibliography style suitable for inclusion in a chapter, rather than at the end of the book. (This feature is a candidate for inclusion in the next update of `amsbook`.)
- a facility to place symbols comparable to the "QED box" at the end of elements other than the proof environment. (Only the proof environment, where it is automatic, can at present accept such an addition in the basic AMS document classes.)

## 1. Framed environment for highlighting important information

The framed environment, `framedthm`, is illustrated by two examples.

> **Theorem 2.1.** *If $(Q, \sigma)$ is a quiver with automorphism such that the associated valued quiver $\Gamma = \Gamma(Q, \sigma)$ contains no loops, then there is a surjective map $\psi \colon \Phi(Q) \to \Phi(Q, \sigma)$ defined by putting $\psi(\beta) := \theta(\tilde{\sigma}(\beta))$, $\beta \in \Phi(Q)$. Moreover, if $\alpha = \psi(\beta)$ is a real root in $\Phi(Q, \sigma)$, then $\beta$ must be a real root in $\Phi(Q)$, uniquely determined up to $\sigma$-conjugacy.*

Note that a framed element will not be broken at the end of a page; such an element falling too close to the bottom of a page will be moved to the next page. Since material treated in this fashion is usually brief, this restriction should not pose a problem. Moreover, presentation as a unit on one page aids comprehension and the ability to locate a particular item at a later time.

---

**Lemma 2.2.** *In the tensor algebra* $\mathsf{T}(\mathscr{Q})$, *the component* $\mathsf{T}^n(M)$ *of grade n decomposes as*

$$\mathsf{T}^n(M) \cong \bigoplus M_{\rho_n} \otimes_{\mathscr{D}_{h_{\rho_{n-1}}}} \cdots \otimes_{\mathscr{D}_{h_{\rho_1}}} M_{\rho_1},$$

*where the sum is formed over the set of paths* $\rho_n \cdots \rho_1$ *of length n.*

---

## 2. Environment for inclusions to be skipped on first reading

A left-indented "inclusion" environment is provided for text intended to be skipped on first reading. It is set one size smaller than the main text, but may be varied by redefining `\inclusionfont`. One argument is required: a heading, which may be empty.

The input for an inclusion is entered like this:

> `\begin{inclusion}{`⟨*optional heading text*⟩`}`
>
> ...
>
> `\end{inclusion}`

One important feature of an inclusion is that it must be able to span multiple pages. The second example below should be long enough to demonstrate this requirement.

> Example without a heading. This prose is set off in a smaller size. It comprises several lines. This prose is set off in a smaller size. It comprises several lines. This prose is set off in a smaller size. It comprises several lines.
>
> Here is the beginning of a new paragraph. This prose is set off in a smaller size. It comprises several lines. This prose is set off in a smaller size. It comprises several lines.

That wasn't very interesting; the next example should be more entertaining.

> ### Jabberwocky[1]
>
> 'Twas brillig, and the slithy toves
> Did gyre and gimble in the wabe:
> All mimsy were the borogoves,
> And the mome raths outgrabe.
>
> "Beware the Jabberwock, my son!
> The jaws that bite, the claws that catch!
> Beware the Jubjub bird, and shun
> The frumious Bandersnatch!"
>
> He took his vorpal sword in hand:
> Long time the manxome foe he sought—
> So rested he by the Tumtum tree,
> And stood awhile in thought.

---

[1]Apologies to Lewis Carroll [**Do**].

And, as in uffish thought he stood,
The Jabberwock, with eyes of flame,
Came whiffling through the tulgey wood,
And burbled as it came!

One, two! One, two! And through and through
The vorpal blade went snicker-snack!
He left it dead, and with its head
He went galumphing back.

"And, has thou slain the Jabberwock?
Come to my arms, my beamish boy!
O frabjous day! Callooh! Callay!"
He chortled in his joy.

'Twas brillig, and the slithy toves
Did gyre and gimble in the wabe:
All mimsy were the borogoves,
And the mome raths outgrabe.

## 3. "In-chapter" bibliography

It is sometimes appropriate to include a brief reference list within a chapter, in addition to, or in place of the main bibliography (which is always a separate chapter). Such a bibliography is presented as an unnumbered section. The `inchapterbibliography` environment produces the desired list. However, it is usually desirable to change the title from "Bibliography" to something more appropriate. This is done by redefining the command `\bibname`; remember that `\bibname` must be changed again before the main bibliography is processed.

This input sets up the format for the local references list.

```
\renewcommand{\bibname}{References for this chapter}
\begin{inchapterbibliography}{Do}
...
\end{inchapterbibliography}
```

The coding of references is the same as for the main bibliography.

### References for this chapter

[Do] Charles Lutwidge Dodgson [Lewis Carroll], *Through the Looking-Glass and What Alice Found There*, 1872.

## 4. End-of-element markers

Especially for pedagogical clarity, textbook authors sometimes use markers (similar to the □ at the end of a proof) to indicate the end of other elements, such as definitions, examples, remarks, and the like. The command `\xqed` is provided for this purpose; it takes one argument: the command for the desired symbol.

The input

    \xqed{\lozenge}

places a lozenge flush right at the end of this paragraph.                    ◇

The command `\qedhere`, which makes it possible to force the QED symbol up onto the last line of a display or list that ends a proof, is not easily adapted to non-proof environments, although consideration is being given to include this in future releases.

If such a situation occurs in practice, you can request assistance by e-mail from the AMS Publications Technical Group at `tech-support@ams.org`; please identify the AMSTEXT series in your message, and include a small, self-contained, LaTeXable file that contains the problem material and enough surrounding text to allow for valid experimentation.

# Bibliography

[HANDBK]  *AMS Author Handbook, Monograph Classes*, Amer. Math. Soc., Providence, RI, September 2014. `http://www.ams.org/tex/Author_Handbook_Mono.pdf`

[THM]  *Using the `amsthm` package, version* 2.20, Amer. Math. Soc., Providence, RI, 2004. `ftp://ftp.ams.org/pub/tex/doc/amscls/amsthdoc.pdf`