Instructions
for Preparation
of Papers
and Monographs

$\mathcal{AMS}$-LaTeX

Version 2.21

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Contents

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OF PAPERS AND MONOGRAPHS: $\mathcal{AMS}$-LaTeX

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1. INTRODUCTION

This manual is directed mainly to authors preparing material for publication by the American Mathematical Society (AMS), using $\mathcal{AMS}$-LaTeX document classes. As such, it deals with the AMS publishing style. Since these document classes are also used by authors who are not submitting items to the AMS, the manual also covers topics of more general relevance. However, it assumes familiarity with standard LaTeX techniques and conventions, and contains only material specific to AMS packages.

Links to information useful in preparing manuscripts and graphics can be found on the AMS Author Resource Center web page [ARC]. That information supplements this manual, and we recommend that you review it.

The AMS produces three major types of publications: journals (both print and electronic), proceedings and conference volumes and collections, and monographs (including textbooks). There is a core AMS document class for each: `amsart`, `amsproc`, and `amsbook`, respectively. For most journals or book series, there is a specific author package, based on one of the core classes. If the specific publication is known, the appropriate author package should be obtained from the AMS web server [AP] and used for preparation of manuscripts. In addition, there is a separate package for editors of proceedings volumes [EP], with facilities for preparing material that does not fit into the normal "article" category.

If the specific publication is not known, an appropriate generic AMS document class can be used:

- `gen-j-l` for journal articles (based on `amsart`)
- `gen-p-l` for articles in book proceedings (based on `amsproc`)
- `gen-m-l` for monographs (based on `amsbook`)

There is also a document class for book reviews in journals: `amsbkrev`.

The tagging of elements in a manuscript—title, author(s), section headings, theorems, etc.— is consistent through all author packages. Thus a manuscript prepared using the appropriate generic document class can be modified trivially to use the specific package, simply by updating the `\documentclass` statement. For example, specify the *Contemporary Mathematics* proceedings series as follows:

`\documentclass{conm-p-l}`

Each author package contains two PDF files (this manual and the Author Handbook [AH]), a class file, a template file for the top matter, sample documents, and a `README` file that contains information about each file in the package. Always read the `README` file first.

When an AMS author package is used, both LaTeX and a recent version of $\mathcal{AMS}$-LaTeX must be installed on the computer being used for manuscript preparation. The AMS Author Resource Center web page [ARC] has a link to download the most recent version of $\mathcal{AMS}$-LaTeX. The version number appears at the top of the file `amsmath.sty` (and other files in the collection), and is also reported in the log file of a LaTeX run; make sure you have version 2.0 or later.

2. ARTICLE PREPARATION

We first address articles intended for journals and proceedings volumes. Monographs are addressed in a separate section (see page 10).

Starting a new article. Individual articles generally have the following structure:

- `\documentclass{...}`
- preamble (for document-specific customizations)
- `\begin{document}`
- top matter information
- `\maketitle` (to set the top matter)
- article body
- reference list
- `\end{document}`

A detailed template file (included in each package) provides a complete set of commands for the article top matter, and the instructions for using them. The most effective way to start a new article is to make a copy of the template and fill it in.

3. The preamble

The area between the `\documentclass` statement and the line `\begin{document}` is referred to as the "preamble". This is the place to load external packages and define document-specific commands.

Available `\documentclass` options are described in the file `amsclass.dtx`. Process this file with LaTeX to obtain a version with human-readable documentation. One option does need to be mentioned here: `[psamsfonts]`; include this option as

`\documentclass[psamsfonts]{...}`

to ensure correct sizing of fonts in environments other than normal text.

Packages. The AMS document classes incorporate the code for the AMS theorem (`amsthm`) package and automatically load the `amsmath` package. It is not necessary to request either one explicitly. The user guides for these packages [ATP, AMG] contain the details, which will not be repeated here. The `amsfonts` package is loaded as well, unless the `[noamsfonts]` option is specified; see the AMSFonts User's Guide [AFG] for the features provided.

Not all publicly available packages are compatible with the AMS document classes. For this reason, we mention some that are:

- `amssymb` provides names for additional symbols from the AMS symbol fonts; see [AFG] for details.
- `amsmidx` supports multiple indexes for a book; see page 7.
- `graphicx` is part of the LaTeX suite, preferred for inclusion of graphics.
- `longtable` facilitates tables longer than one page.
- `upref` forces cross-references with `\ref` to roman; see "Roman type", page 6.
- `xypic` is recommended for creating commutative diagrams.
- `natbib` supports author-year referencing, appropriate for historical and expository works.

Some of these recommendations are noted in the templates that are included in every author package.

There are several packages that cause particular problems for AMS production. Their use should be avoided if possible:

- `psfrag`, for applying labels externally to included graphics, may result in a PostScript that can't be converted properly to PDF.
- `epsfig` has been superseded by `graphicx`.
- `diagrams`, by Paul Taylor, contains a "time bomb" that renders it inappropriate for a production environment.

Don't load any packages that aren't actually needed.

New commands. Place all definitions for new commands in the preamble. This includes instructions to access fonts that are not already defined in the AMS document classes or `amsmath`, such as a new math alphabet (see [AMG]).

Always use `\newcommand`; this will let you know if the name you have chosen has already been used. Do not redefine any command from LaTeX, `amsmath`, or

any AMS document class, as this could cause problems in AMS production. New definitions may be used to provide shorthand forms for mathematical expressions that are used frequently, but do not use new definitions for text; for articles posted on line, this will prevent indexing software from identifying relevant references.

Use commands and environments provided by the AMS document classes and standard packages whenever applicable—for example, you should use the AMS `proof` environment rather than define your own alternative.

When the file is complete, remove any commands that haven't been used.

4. Top matter

The top matter associated with an article includes information that would appear in a bibliographic reference to the paper, plus additional information about the author(s), subject classifications, key words, acknowledgments of support, and the abstract.

Summary of tags and elements. Table 1 lists the top matter commands provided by $\mathcal{AMS}$-LaTeX version 2.0 and later. Not every tag is necessary for each paper. The table shows which tags are necessary and which are optional. Requirements for monographs are somewhat different and are described later. The template file included in every author package contains all the necessary tags and instructions for using them.

TABLE 1. Top matter tags

```
\documentclass{amsart}
```
⟨preamble commands, such as `\newcommand`, etc.⟩

```
\begin{document}
```

	Required by	
	Journals	Books
`\title[...]{...}`	yes[1]	yes[1]
`\author[...]{...}`	yes[1]	yes[1]
`\contrib[...]{...}`	no[2]	—
`\address{...}`	yes	yes
`\curraddr{...}`	no	no
`\email{...}`	no	no
`\urladdr{...}`	no	no
`\dedicatory{...}`	no	no
`\date{...}`	—[3]	—
`\thanks{...}`	no	no
`\translator{...}`	—[3]	—[3]
`\keywords{...}`	no	no
`\subjclass[2000]{...}`	yes	yes
`\begin{abstract}...\end{abstract}`	yes	no
`\maketitle`	yes	yes

---

[1] If no short form is needed, omit the brackets.
[2] For contributors, see details on page 4.
[3] If this is necessary, it will be filled in by the AMS staff.

Title. For AMS journal articles, capitalize only the first word and proper nouns in the title. For articles in an AMS proceedings volume, capitalize the first and last words of the title and all nouns, pronouns, adjectives, adverbs, and verbs. Articles, conjunctions, and prepositions should be lowercased unless they are the first or last word of the title. These rules should be followed even if the publication in which the article appears has another style. The style for the particular publication will be generated automatically when the article is processed at the AMS.

A multiline title may be left for LaTeX to break, or a desired break may be indicated by \\ for a proceedings article, or by `\linebreak[1]` for a journal article.

Unless the title is very short, provide a form of the title suitable for use in running heads. This should be entered in brackets between the tag `\title` and the full title: `\title[short title]{full title}`. Do not use author-defined macros in the title.

Author information. Enter the name(s) of the author(s) with the tag `\author`, using standard capitalization for proper names. Use a separate `\author` command for each author. Names will be combined by LaTeX according to the dictates of the document class. See also "contributors", below.

If the author name(s) cannot fit in the space available for the running head, enter a shortened form for each name in [brackets] between the tag `\author` and the full name. Acceptable shortened forms use initials for all but the surname(s). For example,

`\author[J. Smith]{Joseph Smith}`

If the list of shortened author names is still too long for the running head (including a reasonable space for the page number), it can be shortened for a journal article as in the following example:

`\author[J. Smith et al.]{Joseph Smith}`
`...`
`\author[]{⟨second name⟩}`
`...`
`\author[]{⟨final name⟩}`

For a proceedings article, the list of names may be shortened like this, as a last resort:

`\markleft{J. SMITH ET AL.}`

Note that `\markleft` is available only for the document class `amsproc.cls` versions 2.20 and later; it is not a basic LaTeX command. Data provided with `\markleft{}` *must* be in all capital letters. Place `\markleft{}` after `\maketitle` in your file.

For each author you should provide one or more addresses. Tag them as follows, grouping them in this order by author:

`\address{...}`	address where the research was carried out (required)
`\curraddr{...}`	current address, if different from the research address (optional)
`\email{...}`	address for electronic mail (optional)
`\urladdr{...}`	URL address (optional)

Do *not* include any addresses within the scope of an `\author{}` command (this is different from basic LaTeX). Do not use abbreviations in addresses.

Addresses are considered part of the top matter, but in AMS articles they are ordinarily printed at the end of the article following the bibliography (this is different from basic LaTeX). Suitable labels will indicate the current, email, and URL addresses, typically *Current address:*, *E-mail address:*, *URL:*, respectively.

If ~ is needed in a URL address, enter it directly as ~ if you are using $\mathcal{AMS}$-LaTeX version 2.20 or later; otherwise, see the Author FAQ [AF] for instructions.

Contributors (new with version 2.20)**.** Contributors are much like authors, but are responsible for only a portion of an article, e.g., an appendix or auxiliary tables. The bracketed portion is not optional; it gives the exact text that will be printed to indicate the nature of the contribution:

`\contrib[with an appendix by]{William Rogers}`

Multiple contributors and contributions are input like this:

`\contrib[with Appendix A by]{William Rogers}`
`\contrib[]{Henry Taylor}`
`\contrib[and Appendix B by]{John Henderson}`

Note the empty brackets on the second line. Multiple contributors indicated in this way will be combined with "and" added where appropriate. Contributors will not be included in running heads. Addresses provided for contributors will be treated the same as for regular authors.

Dedication. Use the tag `\dedicatory` for such things as "Dedicated to Professor X on the occasion of his eightieth birthday." If the dedication is longer than one line, you may indicate a break with `\\`.

Acknowledgments of support and other first-page footnotes. Use the command `\thanks` to acknowledge grants and other kinds of support or for other general information not covered by one of the more specific commands such as `\keywords` or `\subjclass`. Enter `\thanks` immediately following the address(es) for the relevant author, *not* within the scope of the `\author{}` command (this is different from basic LATEX). Like `\address`, `\thanks` can appear more than once in the top matter. Each occurrence will be printed as an unnumbered footnote at the bottom of the first page of the article.

Subject information. Subject classifications and key words, like acknowledgments, are part of the top matter and appear as unnumbered footnotes at the bottom of the first page.

Subject classifications may be primary (the major topic(s) of the paper) or secondary (subject areas covered by ancillary results, motivation or origin of problems discussed, intended or potential field of application, or other significant aspects worthy of notice). At least one primary subject classification is **required**. Additional primaries and secondaries are optional.

These classifications are entered as

`\subjclass[2000]{Primary ⟨primary class⟩; Secondary ⟨secondary classes⟩}`

(Omitting `[2000]` will cause the 1991 Subject Classification to be cited.)

To determine the classifications, use the 2000 Mathematics Subject Classification scheme that appears in annual indexes of *Mathematical Reviews* beginning in 1999. It can also be accessed on the Web at www.ams.org/msc or obtained in printed form from AMS Customer Services. Please use the full number; the two-digit code from the Contents of *Mathematical Reviews* is **not** sufficient.

Key words are not required but may be provided by an author if desired. They should be entered as `\keywords{...}`, with only the first word and proper nouns capitalized.

Abstract. With an AMS document class, place the abstract before `\maketitle`, contrary to the practice with the basic LATEX document classes. This is necessary to ensure that the abstract can always be printed in the proper location and style. If the abstract is given after `\maketitle`, it will be printed in place and generate a warning message.

Input the abstract text between `\begin{abstract}...\end{abstract}`. It may comprise multiple paragraphs and include unnumbered displayed material if appropriate. The length of the abstract depends primarily on the length of the paper itself and on the difficulty of summarizing the material. An upper limit of about 150 words for short papers and 300 words for long papers is suggested. Do not use author-defined macros, `\cite`, or `\ref` in the abstract.

5. Document body (all document classes)

Linking for the Web. All AMS primary journals are posted on line. Electronic manuscripts prepared in LATEX for any AMS journal should be tagged for maximum linking on the Web. For use of `\label`, `\ref`, and `\cite`, see [MG]; for `\eqref`, see [AMG].

Headings. Four levels of headings are provided to permit logical sectioning of a manuscript. These headings are applicable to individual articles and to chapters of a monograph. (Headings specific to monographs are listed under *Monograph formatting.*)

```
\specialsection{...}
\section[...]{...}
\subsection[...]{...}
\subsubsection[...]{...}
```

\specialsection is for long articles that need extra divisions (e.g., parts) at a level above the \section level.

Explicit line breaks are obtained by \\ in first-level section headings.

Any heading may be given a label to allow references to be made to it, by including a \label{...} command with a unique identifier directly *after* the heading. References are made using the command \ref{...} and the same identifier. For example,

```
\section{Monograph formatting}
\label{s:mono}
```

will establish a label for this section that can be referred to with \ref{s:mono}. Cross references of this sort will require LᴬTEX to be run at least twice for proper resolution. A warning at the end of the LᴬTEX run, "Cross references may have changed...", should be heeded in this regard.

Mathematical text. For instructions on preparing mathematical text, refer to [AMG] and [Gr]. See also "Roman type", below.

Lists. Follow usual LᴬTEX conventions for producing list environments.

Theorems, lemmas, and other proclamations. See the manual *Using the* `amsthm` *package* [ATP] for details. Theorem environments following AMS style with respect to punctuation, spacing, and paragraphing are defined in the AMS document classes. This is incompatible with the LᴬTEX theorem package, which cannot be used with the AMS document classes.

Three different theorem styles are provided by AMS document classes: plain, definition, and remark. By referring to these styles and using the \newtheorem command, you can build a complement of theorem environments appropriate for any paper or monograph. All \newtheorem specifications should be included in the preamble; a starter set is included in the template for every AMS author package.

Theorem support is also available separately in the amsthm package for users of document classes other than those from the AMS.

Equations. Check displayed equations carefully, making sure they are broken and aligned following the guidelines in [Sw, pp. 44–48].

Roman type. Numbers, punctuation, (parentheses), [brackets], {braces}, and symbols used as labels should always be set in roman type. This is true even within the statement of a theorem, which is ordinarily set in italic type.

Be careful to distinguish between roman elements that are mathematical in nature (e.g., "a group of class 2"), and those that are part of the text (e.g., a label or a year). Mathematical expressions, no matter how short or insignificant, should be coded as math, by enclosing them within dollar signs $...$ or \(...\). Roman text elements should be coded as \textup{...} in potentially nonroman environments such as theorems.

Abbreviated forms of mathematical terms are also usually set in roman type to distinguish them from mathematical variables or constants. Use the control sequences for common mathematical functions and operators like log and lim; use \DeclareMathOperator to add additional operator names (see [AMG, §5]).

The style of reference citations, though publication-dependent, is usually roman. To ensure consistency and support linking for the Web, **always** use the standard LᴬTEX \cite command when citing a reference (alternate forms of the

`\cite` command are provided by `natbib` if that package is used for bibliographies in author-year style). Internal references with the `\ref` command are not automatically roman in non-roman environments, but can be forced by using the `upref` package (part of the $\mathcal{AMS}$-LATEX collection).

Exercises. Exercises are produced using the `xca` and `xcb` environments. `xca` may be used in any publication, but must be defined in the document preamble with `\theoremstyle{definition}` and the `\newtheorem` command; it is used for exercises that occur within a section. `xcb` is defined only for monographs and is used for exercises that occur at the end of a chapter.

Indexing facilities. The tags needed for *MakeIndex* are already included in AMS document classes. Do not include the `makeidx` package, but do put the command `\makeindex` in the preamble to launch a single index. See [MG, chapter 11] and [KD, chapter 11] for use of *MakeIndex*.

A package for multiple indexes, `amsmidx`, is included in the $\mathcal{AMS}$-LATEX collection beginning with version 2.20. Unlike other multiple-index packages, `amsmidx` is compatible with the AMS document classes. To use this package, put these commands into the preamble:

`\usepackage{amsmidx}`
`\makeindex{⟨name of first index file⟩}`
`\makeindex{⟨name of second index file⟩}`

To identify index entries in the text:

`\index{⟨name of index file⟩}{⟨index term⟩}`

In the backmatter, where the indexes are to appear:

`\Printindex{⟨name of first index file⟩}{⟨title of first index⟩}`
`\Printindex{⟨name of second index file⟩}{⟨title of second index⟩}`

Note the capitalization of the `\Printindex` command.

6. Floating objects: Figures and tables

Figures and tables are usually handled as floating inserts. Such items are often so large that fitting them into the document at the point of reference may cause problems with pagination. Placing such items into a floating insert allows them to be repositioned automatically by LATEX as required for good pagination.

A floating insert generally contains one of these possibilities:

- LATEX code that produces an object such as a table or commutative diagram;
- a command to incorporate an item produced by another application (most often an Encapsulated PostScript (EPS) file produced by a graphics utility; see *Electronic graphics*, page 8).

If a figure is described by LATEX code (e.g., using `xypic` or the `picture` environment), it should be included directly in the file.

Placement. Floats should

(1) be numbered consistently throughout the paper (figures and tables are numbered separately),
(2) be placed at the top or bottom of the page,
(3) have an in-text reference, and
(4) definitely appear within the same section as their first text reference.

A figure or table should not precede its first text reference unless they both appear on the same page spread. When a figure or table is an integral part of text, it may appear unnumbered in place in the middle of text.

Figures and tables should be allowed to float according to the LATEX defaults preset by the document class. If you are submitting a file that will be processed at the AMS (this applies to all journal articles), you could introduce major problems with pagination if you hard-set your figures and tables by using the `[h!]` option. Production problems will be avoided when you use the appropriate author package class file and avoid using figure or table options. For electronic manuscripts, the

final placement of inserts will be determined by the AMS editorial staff, on the basis of the most appropriate page layout.

Captions. Captions for floating inserts are usually positioned above a table and below a figure. The following is the general structure used to specify a figure insert, with a caption at the bottom:

```
\begin{figure}
\includegraphics{⟨file name of .eps file⟩}    or    ⟨code for the insertion⟩
\caption{⟨caption text⟩}
\label{⟨reference label⟩}    (optional)
\end{figure}
```

This is the general structure for a table insert, with a caption at the top:

```
\begin{table}
\caption{⟨caption text⟩}
\label{⟨reference label⟩}    (optional)
⟨code for the insertion body⟩
\end{table}
```

Caption headings (e.g., "TABLE 3.1." or "FIGURE 7.") will be supplied automatically. The ⟨caption text⟩ is any appropriate descriptive text, and may be omitted if no descriptive text is desired. (The style of the caption differs from the basic LATEX caption style.) A reference label should usually be associated with the caption, and must be given *after* the caption. A reference in text to the figure or table has the form \ref{⟨reference label⟩}.

LATEX packages for captions may appear to work with the AMS document classes, but the caption style doesn't usually match the AMS style.

Electronic graphics. Graphics created by applications other than LATEX may be submitted to the AMS in an electronic format. This includes output from graphics applications as well as scanned photographs or other computer-generated images. The AMS strongly prefers such graphics in Encapsulated PostScript (EPS) format.

Use the graphicx package (part of the graphics bundle of LATEX) to embed references to EPS graphics directly in a LATEX file; see the manual grfguide.tex [Ca]. Another valuable reference is the manual "Using EPS Graphics in LATEX 2_ε Documents" [Re].

Other packages are not recommended, as there are numerous areas of incompatibility which may result in the need for manual intervention, delaying processing and increasing the cost.

The EPS files will not be physically included in the LATEX file. You must submit a separate file for each graphic along with the LATEX document. No matter what method is used to produce a graphic, it is necessary to provide a paper copy to the AMS for verification. Double check to make sure the electronic and paper versions are the same.

Compatibility requirements for graphics. There are two important requirements that must be observed when embedding graphics.

Omit path names for the included files. Instead of

```
\includegraphics{/usr/joe/book/figures/fig1.eps}
```

use just the name of the file:

```
\includegraphics{fig1.eps}
```

The easiest way to do this is to place the graphics files in the same directory as the file(s) being TEXed.

Do not use the \graphicspath{⟨directory list⟩} command to establish a path. This will result in the path being included in the DVI file, which will be impossible to process at the AMS. It may be possible to specify a path using one of the environments recognized by the TEX engine (TEXINPUTS, for example); instructions for setting these environments should be in the documentation for your system.

Graphics commands must be compatible with the *dvips* output driver. This is particularly important if you are submitting a DVI file for a camera-ready publication. The method is specific to the graphics package you are using; a typical method is to use a file `graphics.cfg` containing the line `\ExecuteOptions{dvips}` when you run LATEX to create the DVI or PostScript file to send to the AMS.

Color graphics. The AMS normally does not include color graphics in the print version of its journals or in conference or proceedings volumes unless the Editor and Publisher mutually agree that color graphics are warranted. (Note, however, that color graphics that appear in black and white in the print version of journal articles will appear in color in the electronic version as submitted.)

Color figures should have a resolution of at least 300 pixels per inch when printed at 100%, and must also be suitable for printing as grayscale. Ideally, the files should be in EPS format; TIFF and JPEG are also acceptable. Note that PostScript is not the same as Encapsulated PostScript; the latter is a subset of the former.

Technical requirements for graphics. Technical requirements for graphics are detailed in the document *Creating graphics for use in AMS books and journals* [CG].

7. Bibliographic references

Using BibTEX to prepare a bibliography. An author may find it convenient to maintain a file of references in BibTEX form, as described in *The LATEX Companion* [MG, Section 13.2]. Two BibTEX styles are provided:

`amsplain.bst`	will produce numeric labels; preferred for articles;
`amsalpha.bst`	will produce labels constructed from the author name(s) and year of publication.

Both will translate references in a BibTEX input (`.bib`) file to LATEX input in a `.bbl` file in the form appropriate for AMS publications, including all necessary formatting instructions. This method of preparing bibliographies is therefore recommended.

To access a BibTEX bibliography in a paper or monograph, include these instructions in the appropriate place in the input file:

`\bibliographystyle{⟨style⟩}`   (`amsplain` or `amsalpha`)
`\bibliography{⟨name of bibliography .bib file⟩}`

Running BibTEX on the `.bib` file will produce a `.bbl` file. The `.bib` file may have any name the author finds convenient; however, the `.bbl` file must have the same name as the source file for a monograph from which it is input, so it may be necessary for the author to rename it. For an article, after the bibliography has been completed (including processing by BibTEX), the contents of the `.bbl` file should be inserted into the main article input file, replacing the `\bibliographystyle` and `\bibliography` statements.

Items in the bibliography are usually ordered alphabetically by author. BibTEX processing may alter this order, especially if the `amsalpha` style is used.

All categories of bibliographic entries listed in [MG, Table 13.1] are supported in the two AMS BibTEX styles. In addition to the fields listed in Table 13.1, a `language` field is provided in the AMS styles for use in identifying the original language of an item whose title has been translated.

The `natbib` package (available from CTAN) provides an author-year style that is compatible with the AMS document classes. This should ordinarily be used only for monographs or articles on historical topics.

Standard abbreviations for periodicals should be obtained from [ASMR].

Preparing a bibliography without BibTEX. The references section of a paper is contained between the commands

`\begin{thebibliography}{⟨model label⟩}`
`\end{thebibliography}`

This environment is resolved as an unnumbered section in an article or an un-numbered chapter in a monograph, following AMS publication specifications. The indentation for the labels is set to an appropriate width using the model given with the `\begin` command. Thus the widest label in the bibliography should be used as the model; for example, `99` will provide space for a 2-digit numeric label.

For the proper order of reference elements and use of fonts and punctuation, look at an issue or volume in the journal or book series for which your document is intended and follow the examples you see there. More examples are given in [Sw].

Reference input. Begin each item with the command `\bibitem{`⟨bibitem label⟩`}`. The LATEX default is to number references automatically; however, other labels may be used by inserting an optional key argument in square brackets between the command and the internal label:

`\bibitem[ABC]{Arno1994}`

The item label and the key need not be identical. Whatever appears within the `[ ]` is what prints; whatever is within the curly braces is used for linking and must not include any math or special characters.

Give at least one full name; initials and last name is an acceptable form. If a subsequent reference is by the same author(s), use `\bysame` instead of the name(s).

For examples, refer to [Sw].

8. Monograph formatting

A monograph is a long work by a single author or co-authors on a single subject. Each chapter should be prepared as a separate file, as should the bibliography. In addition, a "driver" file should be used to input all the others. These files should be given meaningful names, so that when they are transmitted to the AMS, there will be no question about which file represents which chapter. For example, a monograph by author Grey might be composed of files named `grey.tex` (the driver file), `grey-ch1.tex`, `grey-ch2.tex`, ..., `grey-ch12.tex`, `grey-appa.tex`, etc., and `grey-bib.tex` (or `grey.bbl` if BibTEX is used). If the author name is a common one, please include something to make it unique, such as first initials.

Information that identifies the author(s), the subject matter of the monograph, acknowledgments of support, and so forth, will appear in the front matter of the book. Place this information in the driver file, and use the tags shown below. Most of these are the same as the tags associated with the top matter of an article; see the *Top matter* section (page 3) for explanations and an indication of which tags are required.

Starting a new monograph. The driver file for a monograph is generally made up of the following:

- `\documentclass{...}`
- preamble (where extra definitions might go)
- `\begin{document}`
- `\frontmatter`
- title page and copyright page information
- `\maketitle` (to set the title page and copyright page; see note)
- `\include` files (e.g., preface, introduction)
- `\mainmatter`
- `\include` files (e.g., main chapters, appendices)
- `\backmatter`
- commands for bibliography, index
- `\end{document}`

Note: The title and copyright pages are for information only, so that a printed copy can be associated with the correct author(s). The final copy will be prepared at the AMS, using information provided by the author.

For a typical driver file, see the template for `amsbook`, included in the $\mathcal{AMS}$-LATEX collection.

Instructions for preparing a dedication page are given in the AMS Author FAQ [AF].

The table of contents will be produced automatically from a `.toc` file produced anew in each run of LaTeX. Since there is no `.toc` before the first run, the body of the table of contents will be empty on the first run. It is AMS style to include only first-level heads, chapter titles, and part titles in the table of contents.

Chapters in AMS book series start on right-hand (odd-numbered) pages. Blank pages will be provided as necessary at the end of earlier material to accomplish this.

Chapter titles. Chapter titles should be capitalized as follows: the first and last words of the title and all nouns, pronouns, adjectives, adverbs, and verbs should be capitalized. Articles, conjunctions, and prepositions should be lowercased unless they are the first or last word of the title.

There are three common variations of the chapter title. The form with a chapter number is most common:

```
\chapter{Matrix Algebras}
```

The second variation is an appendix, where the word "Appendix" replaces the word "Chapter". Use the command `\appendix` before the first `\chapter` command in a sequence of appendix chapters.

```
\appendix
\chapter{Poisson Integral}
```

In addition to "Appendix", the counter will produce letters "A", "B", "C", etc., instead of numbers. (Be sure to use the command `\backmatter` after the last appendix to avoid the word "Appendix" in the table of contents entries for bibliography and index.)

The third variation is used for an element such as a preface or introduction, which has no pretitle text at all. For this, use the `\chapter*` command:

```
\chapter*{Preface}
```

Unlike the LaTeX `book` class, the AMS document classes will place entries for unnumbered chapters in the table of contents, as required by AMS style.

Monograph running heads. The chapter title is used for the left running head and section headings for the right running head. The chapter title repeats if there are no sections. If the text of a section heading is too long to fit as a running head, use the square-bracket option to specify a shortened form for use in the running heads:

```
\section[Fourier coefficients of periodic functions]
   {Fourier coefficients of continuous periodic functions
   of bounded entropy norm}
```

If the chapter title is too long to fit as a running head, a shortened form can be supplied in a similar way. Full chapter titles and section headings will be used in the table of contents (this is different from basic LaTeX).

Numbering of figures and tables. The preferred AMS style for numbering figures and tables is to start numbering from 1 within each chapter, and to include both the chapter and element number in the printed caption heading. For example, the first figure in Chapter 5 would be numbered "FIGURE 5.1". The `amsbook` document class resets figure and table numbers automatically, but does not include the chapter number in the printed caption. To add the chapter number, place these lines in the preamble of the driver file:

```
\numberwithin{figure}{chapter}
\numberwithin{table}{chapter}
```

9. Getting help

Many questions raised by authors are answered in the AMS Author FAQ [AF]. Please check there before asking for assistance.

If you encounter difficulties in preparing or submitting your manuscript in electronic form after it has been accepted for publication by the appropriate editorial board, you can ask for help from the American Mathematical Society at:

> Publications Technical Group
> American Mathematical Society
> 201 Charles Street
> Providence, RI 02904-2294
>
> Phone: 800-321-4267, ext. 4080   or   401-455-4080
> Email: tech-support@ams.org

Please supply the name of the journal or book series, the editor's name if the manuscript is for a proceedings volume, and a concise explanation of the problem.

10. Differences between the `article` and `amsart` document classes

Most input differences between the basic LATEX `article` and the $\mathcal{AMS}$-LATEX `amsart` classes are in the coding of the top matter. If an article is prepared using `article`, simply converting the top matter may be all that is needed to conform to `amsart` style. These differences are also generally relevant to the `proc` and `amsproc` classes.

Author information. This is the typical LATEX input for author information:

```
\author{Author1\thanks{Research sponsored ...}}\\Affil1\\Address1
\and
Author2\\Affil2\thanks{On leave ...}\\Address2
\and
Author3\\Affil3\\Address3}
```

Addresses are printed following each author name at the top of the article. `\thanks` generates a labeled footnote with a flag at the point of reference.

Input for `amsart` is quite different:

```
\author{Author1}
\address{Affil1}
\curraddr{Address1}
\email{...}
\urladdr{...}
\thanks{Research sponsored ...}
\author{Author2}
\address{Affil2}
\curraddr{Address2}
\thanks{Author2 is on leave ...}
\author{Author3}
\address{Affil3}
\curraddr{Address3}
\email{...}
```

Addresses are printed at the end of the article. Footnotes generated by `\thanks` are unindented, unnumbered, and unmarked; if `\thanks` is input for more than one author, it is a good idea to identify the relevant author in the footnote text.

Abstract. For `article`, the abstract is entered after `\maketitle` and printed as the first section in the body text.

For `amsart`, the abstract is entered *before* `\maketitle`; the print location may vary, depending on the particular publication.

Other differences. The `amsart` class incorporates `amsthm` and indexing capabilities corresponding to `makeindex`, and loads `amsmath`; it also loads `amsfonts` unless the `[noamsfonts]` option is specified. No packages are loaded automatically by `article`.

Location of page numbers and use of running heads differs: `article`, by default,

- centers the page number at the bottom of the page;
- omits running heads;
- provides various `\pagestyle` settings to add or remove headings;
- provides `\markright` and `\markboth` to adjust the content of running heads.

The defaults for `amsart` are:

- number on first page is at bottom center; on other pages it is at the outside margin in the running heads;
- the left-hand running head contains the author(s), and the right-hand, the title; both are uppercased automatically, and a short form may be provided for either using the `[...]` option for the relevant element;
- `\markleft`, `\markright`, and `\markboth` can be used to override the running head content.

There are differences in where the print is located on the output page: By default, `article` centers the text horizontally; if the `[twoside]` option is used, odd pages are set to the left, even pages to the right, for ease in binding. `amsart` always centers the type both vertically and horizontally using `\calclayout`, which effectively disables the `[twoside]` option.

The `article` style emboldens the headings of theorems, including optional additional text, and omits punctuation; `amsart` produces bold theorem headings with a final (bold) period, but optional text is lightface.

There are also differences in the styles of captions and lists that will not be described here.

REFERENCES

[AF]   AMS Author FAQ, www.ams.org/authors/author-faq.html

[AFG]   *User's guide to AMSFonts version* 2.2d, Amer. Math. Soc., Providence, RI, 2002. Link at www.ams.org/tex/amsfonts.html

[AH]   *AMS Author Handbook*, Amer. Math. Soc., Providence, RI, 2007. Link at www.ams.org/authors

[AMG]   *User's guide for the* `amsmath` *package* (*version* 2.0), Amer. Math. Soc., Providence, RI, 2004. Link at www.ams.org/tex/amslatex.html

[AP]   Author packages for publishing with the AMS,   ?????? www.ams.org/tex/author-info.html

[ARC]   AMS Author Resource Center, www.ams.org/authors   ??????

[ASMR]   *Abbreviations of names of serials* [*reviewed in Mathematical Reviews*], Amer. Math. Soc., Providence, RI, www.ams.org/msnhtml/serials.pdf.

[ATP]   *Using the* `amsthm` *package, version* 2.0, Amer. Math. Soc., Providence, RI, 2004. Link at www.ams.org/tex/amslatex.html

[Ca]   David Carlisle, "Packages in the 'graphics' bundle", available in electronic form as `macros/latex/required/graphics/grfguide.pdf` from www.ctan.org/tex-archive

[CG]   *Creating graphics for use in AMS books and journals*. Link at www.ams.org/authors

[EP]   Guide to AMS editor's package, www.ams.org/authors/editpkg.html

[GRM]   Michel Goossens, Sebastian Rahtz, and Frank Mittelbach, *The LATEX Graphics Companion*, Addison-Wesley, Reading, MA, 1997.

[Gr]   George Grätzer, *Math into LATEX*, third ed., Birkhäuser, Boston/Springer Verlag, New York, 2000.

[Hi]   Nicholas J. Higham, *Handbook of Writing for the Mathematical Sciences*, second ed., SIAM, Philadelphia, PA, 1998.

[KD]   Helmut Kopka and Patrick Daly, *A Guide to LATEX*, fourth ed., Addison-Wesley, Boston, 2004.

[MG]   Frank Mittelbach and Michel Goossens, with Johannes Braams, David Carlisle and Chris Rowley, *The LATEX Companion*, second ed., Addison-Wesley, Reading, MA, 2004.

[MSC]   2000 *Mathematics subject classification*, Amer. Math. Soc., Providence, RI, 1999; searchable on line at www.ams.org/msc.

[Re]   Keith Reckdahl, "Using EPS graphics in LATEX 2_ε documents", available in electronic form as `info/epslatex.ps` or `.pdf` from www.ctan.org/tex-archive

[SHSD]   Norman E. Steenrod, Paul R. Halmos, Menahem M. Schiffer, and Jean A. Dieudonné, *How to Write Mathematics*, sixth printing 2000, Amer. Math. Soc., Providence, RI, reprinted with corrections 1981.

[Sp]   M. D. Spivak, *The Joy of TEX*, second revised ed., Amer. Math. Soc., Providence, RI, 1990.

[Sw]   Ellen E. Swanson, *Mathematics into Type*, updated ed., Amer. Math. Soc., Providence, RI, 1999.