

# AMS Author Handbook Memoirs Class

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## CHAPTER 1

# Introduction

This handbook is directed mainly to authors preparing material for publication by the American Mathematical Society (AMS), using AMS- $\text{\LaTeX}$  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 handbook also covers topics of more general relevance. However, it assumes familiarity with standard  $\text{\LaTeX}$  techniques and conventions, and contains only material specific to AMS packages.

The tagging of elements in a manuscript—title, author(s), section headings, theorems, etc.—is consistent through all AMS author packages, and the structure of elements in the body is based on that of the original  $\text{\LaTeX}$  document classes. Thus a manuscript prepared using an appropriate generic document class can be modified trivially to use a more specific AMS document class simply by updating the `\documentclass` statement and making a few adjustments to the tagging of data in the top matter. For the *Memoirs of the American Mathematical Society*, use `\documentclass{memo-1}`. (The `-1` in the `\documentclass` name is an “ell”, for  $\text{\LaTeX}$ , not a “one”.)

The AMS- $\text{\LaTeX}$  package is available from:

[www.ams.org/arc/journals/journal-produce.html](http://www.ams.org/arc/journals/journal-produce.html)

For more information, see Chapter 5.

### What’s in it for the author?

If the guidelines in this handbook are followed, there are some clear benefits.

- The time between receipt of the manuscript and publication will be minimized.
- The opportunity for introducing unintended errors will be greatly reduced.

As author, *you* are responsible for the content of your *Memoir*. At the production end, the concern is to turn the (electronic) manuscript into a published document in the style of the *Memoirs*; this includes various electronic outputs that involve (automatic) conversion to non- $\text{\LaTeX}$  forms. Use of standard packages and elimination of unneeded material from your files (unused macro definitions and packages, and commented text) will reduce the need for technical tinkering.

If you have special requirements, assistance can be requested—*before* submission of your files—from the technical support group; their email address is given on page 29.

## CHAPTER 2

# Using the AMS *Memoirs* class

### 1. The basic checklist

Some basic principles are important for effective handling of electronic submissions. Keep these principles in mind when preparing and submitting your files.

- Use the **template** supplied in the author package for the *Memoirs*; this will call the `memo-1` document class.
- Copy this template to a file with a name suitable to identify your document. File names should not exceed 20 characters in length, and consist only of numeric or unaccented alphabetic (ASCII) characters. Avoid overly generic file names such as `chap1.tex`, `mybib.tex` or `fig1.eps`.
- Do not modify page sizes or other **dimensions**. Page sizes must conform to the specifications of the *Memoirs*. The text width is determined by the trim size of the publication, and use of a larger text width for the file you submit guarantees that line breaks will change in the final printed version. This is especially critical for math displays, and also affects tables and figures.
- Do not modify the default **font size**, except temporarily for proofreading your work. As with text width, any change will result in different line breaks in the final version.
- Use only “**public**” **packages** available from [CTAN](#) (the Comprehensive T<sub>E</sub>X Archive Network).
- All of 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. Except for a brief overview of how to activate theorems (see page 10), the details will not be repeated here; see the user guides for these packages [[ATH](#), [AMG](#)]. The `amsfonts` package is loaded as well, unless the `[noamsfonts]` option is specified; see the AMSFonts User’s Guide [[AFG](#)] for the features provided.
- Do not redefine **any** existing L<sup>A</sup>T<sub>E</sub>X or AMS-L<sup>A</sup>T<sub>E</sub>X commands. Use `\newcommand`, not `\def`, to be warned if the name you have chosen is already in use.
- Put **definitions** for frequently occurring mathematical expressions together **in the preamble**, before the start of the text of the manuscript. Once a macro is created for an expression, use it for every occurrence of that expression, except as noted below.
- Do not use **author-defined macros** in author names, titles, abstract, section and theorem headings, or references; use only standard commands. Do not hard-code font changes. Use T<sub>E</sub>X coding for special fonts (e.g., boldface or italic) only within the text of the manuscript.
- Avoid the use of math in the title and in other headings. **Titles** are provided to online bibliographic services for indexing. Use of T<sub>E</sub>X math coding (especially

dollar signs) will result in inaccurate bibliographic listings, and problematic PDF bookmarks.

- Determine the **2010 Mathematics Subject Classification** numbers representing the primary and secondary subjects of the work. A list of these numbers can be found on the web at [www.ams.org/msc](http://www.ams.org/msc). Enter the information with `\subjclass[2010]` where indicated in the template.
- Make sure that **graphics** do not extend into the margins. Check that all graphics conform to the AMS graphics guidelines—see Chapter 3, page 22.
- Do not use T<sub>E</sub>X coding to control **line and page breaks**. Lines and pages may break differently in the published *Memoir* from the way they break in the file you submit. If you insert T<sub>E</sub>X coding for line and page breaks, it will have to be removed for production. This work could offset any time saved by your keyboarding the manuscript, and any change to your T<sub>E</sub>X file creates a small chance of additional errors being introduced.
- Avoid explicit horizontal and vertical **spacing commands** for the same reason.
- For **displayed equations**, the AMS style requires equation numbers to be on the left, flush with the left margin. See section 5.7, page 15.
- Use `\cite` to indicate **citations** in the manuscript. The `\cite` command may not appear in an abstract.
- Include all available information for **references**; use the abbreviations for journals and book series from [ABMR], either in print or on the web. All references will be replaced in production by corresponding entries in `amsrefs` form drawn from MathSciNet (see section 7.1, page 18).
- Include the research **address** or institutional affiliation and current address (if different) of each author. Email addresses and URLs may be included optionally. Email addresses will appear in *Memoirs* posted online; URLs will not; both will appear in print.
- **Proofread** your *Memoir* thoroughly and carefully. Publications in *Memoirs* will not be given an editorial proofreading.
- **Verify** that author-submitted source files exactly match the accepted reference copy of the *Memoir*.

## 2. A checklist for using the *Memoirs* class

- *Memoirs* are published both in print and online. In order to expedite processing, the following restrictions are placed on *Memoirs* articles:
  - Only “public” macro packages (packages available from CTAN, the Comprehensive T<sub>E</sub>X Archive Network) may be used.
  - Other macro definitions must be embedded in the preamble of the main file. Electronic files must be able to be processed independently with all macros (not entire macro files) included.
  - Macros should be defined with `\newcommand`, not with `\def`.
- An AMS-specific version of the `hyperref` package will be added by AMS staff at the appropriate stage of the production process primarily for the purpose of adding PDF bookmarks. This will also affect internal cross-references and external URLs.
- Academic or other **affiliations** should be provided. Addresses are not included in the print version but are displayed in the online Abstract page. Use `\address`, `\curraddr`, and `\email` as provided in the template.

- *Memoirs* must contain an **abstract**. The main purpose of the abstract is to enable readers to take in the nature and results of the article quickly. *Zentralblatt* publishes authors' abstracts instead of reviews, so the abstract may also appear there. The abstract should contain no text references to the bibliography unless the bibliographic reference is fully supplied. For example, [3] is meaningless to the reader once the abstract is separated from the *Memoir*. The abstract may comprise multiple paragraphs and include displayed material if appropriate. The length of the abstract depends primarily on the length of the *Memoir* itself and on the difficulty of summarizing the material, but an upper limit of about 300 words is suggested.
- Give information on **grants** or contracts under which the research was performed, including grant number, using the `\thanks` command.
- Unmarked, unnumbered **footnotes** on the abstract page of a *Memoir* should include primary classification numbers according to the 2010 Mathematics Subject Classification scheme ([www.ams.org/msc](http://www.ams.org/msc)) (required); grant information (optional); and key words and phrases describing the subject matter of the *Memoir* (optional). Formatting is automatic when using the AMS style files.
- Use a **driver file** and put the source code for each chapter in a separate file, using `\include` (not `\input`) to pull them together into a single document.
- Ordinarily, every chapter must begin on a new right-hand (odd-numbered) page.
- In **chapter titles**, 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 except for the first and last words of the title.
- The **running heads** on the left-hand (even-numbered) pages should have the chapter title in uppercase letters. The title in running heads should be shortened only if necessary to fit on one line, leaving room for the page number. The running heads on the right-hand (odd-numbered) pages should have the section title (shortened if necessary) in uppercase letters. Uppercasing will be applied automatically if you are using an AMS document class.
- 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 the information you have provided.
- All **bibliographic data**, if it is not already prepared using `amsrefs`, will be converted to `amsrefs` form, drawing data from MathSciNet when that exists. These are called “enhanced references”; see section 7.1, page 18. This is to provide the data in consistent form to online bibliographic services, who may use it for indexing or to compile citation lists.
- A **Consent to Publish and Copyright Agreement** is sent to the author(s) when the accepted work is received at the AMS. Production of your work begins once the signed form is received by the AMS so attend to this as quickly as possible. Authors retain the right to use all or part of their own work in future publications of their own. They are, however, asked, but not required, to sign other rights over to the AMS. If the author(s) transfers copyright to the AMS, the author(s) may dedicate their work to the public domain after 28 years from the date of publication; works in the public domain are not protected by copyright and can be used freely by everyone.

### 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.

**3.1. Document class options.** There are several `\documentclass` options authors might find useful. Some restrictions that are not relevant to the *Memoirs* are not presented here in detail.

- **Paper size** defaults to `[letterpaper]`, and this is the size expected when files are submitted for publication. However, authors outside the U.S. may find `[a4paper]` useful for preparing drafts.
- **Two-sided or one-sided printing** defaults to `[twoside]`. `[oneside]` might also be useful for drafts, but should be removed when files are submitted for publication.
- **Version** can be specified as `[draft]` or `[final]`. The `[draft]` option causes overfull lines to be marked with a black slug in the right margin, calling attention to problems that should be corrected before submission. Also, for a file specified by `\includegraphics`, only the name of the file and the outline of the bounding box will be shown. The default option is `[final]`.
- The **font size** should not be changed from the default, which is `[10pt]`. If a larger size is desired for proofreading, options `[11pt]` or `[12pt]` are also available. However, using a different size will affect line breaks, which is especially critical for displays or when math appears in text. If a different size is used, reprocess your document before submitting files, and check and fix any bad breaks.
- **Equation numbering** defaults to the left, equivalent to `[leqno]`. Numbering on the right, with `[reqno]`, is also supported, but is strongly discouraged because it is incompatible with the marking of proof endings with a `\qed` box at the right margin.

For multiline equations, the equation number is by default centered vertically on the total height of the display (option `[centertags]`). To make the equation number print on the first line (for left-hand numbers) or the last line (for right-hand numbers), there is the option `[tbtags]` (top/bottom).

- **Flush left displays** can be specified by `[fleqn]`. With this option, displayed equations are aligned on the left instead of centered, with an indentation of `\mathindent` from the left margin.

**3.2. 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 [[ATH](#), [AMG](#)] contain the details, which will not be repeated here, but see section 3.4 for suggestions on setting up theorems. 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.



- `amsbooka` provides the ability to specify a different or additional author for an individual chapter or appendix, and have that information automatically included in the TOC in an appropriate format.
- `amsmidx` supports multiple indexes for a book; an alternative package, `imakeidx`, may also be used, with some restrictions; see page 15.
- `chngcntr` provides the command `\counterwithout` that can be used to undo a default counter resetting. For example, `\counterwithout{footnote}{chapter}` will cause footnotes to be numbered continuously through a book, not reset for every chapter.
- `graphicx` is part of the L<sup>A</sup>T<sub>E</sub>X suite, preferred for inclusion of graphics.
- `longtable` facilitates tables longer than one page.
- `mathrsfs` (Ralph Snith’s formal script, `\mathscr`) defines a script font that some authors prefer to the default `\mathcal`.
- `mathtools` provides some display math enhancements that weren’t anticipated when `amsmath` was developed.
- `natbib` supports author-year referencing, appropriate for historical and expository works, when used with BibT<sub>E</sub>X. `amsrefs` has a comparable facility.
- `upref` forces cross-references with `\ref` to roman (upright); see “Roman type”, page 15.
- `tikz` is recommended for creating charts and other graphics, including commutative diagrams.
- `xypic` is also recommended for creating commutative diagrams.

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:

- `biblatex` is not supported by the AMS production stream, and requires that a bibliography be converted to a compatible form, opening a path for potential errors.
- `epsfig` has been superseded by `graphicx`.
- `diagrams`, by Paul Taylor, contains a “time bomb” that renders it inappropriate for a production environment.
- `geometry` changes page dimensions even if no explicit changes are specified by the author.
- `microtype` is not supported by the AMS production stream, which relies on dvi output for automated graphics checking.
- `makeidx` facilities are already in AMS document classes.
- `parskip` redefines the processing of tables of contents, as well as making other format changes that do not follow AMS guidelines.

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

**3.3. 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 L<sup>A</sup>T<sub>E</sub>X, `amsmath`, or any AMS document class, as this could cause problems in AMS production. Avoid

(re)defining one-letter commands; many already exist, and a redefinition can result in mysterious error messages or difficult to detect errors in output.

New definitions may be used to provide shorthand forms for mathematical expressions that are used frequently, but do not use new definitions for ordinary text; for *Memoirs* posted online, 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 defining your own alternative.

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

**3.4. Theorem declarations.** Comprehensive theorem facilities are provided by the inclusion of the `amsthm` code in the AMS document classes, but to use them, the particular theorem types must be activated in the preamble. A theorem “type” consists of two parts: a `\theoremstyle` and a `\newtheorem` statement. Three pre-defined theorem styles are provided: `plain` (default) adds extra space above and below, and sets the text in italic; `definition` adds space above and below, but sets the text in upright type; `remark` has no extra space above or below, and sets the text in upright type. Suggested associations for theorem types and theorem styles are given in the `amsthm` documentation [[ATH](#)].

To declare the theorem types to be used, list the declarations below the appropriate `\theoremstyle` line, as follows:

- `\newtheorem{thm}{Theorem}` will set up an environment `thm` that will be numbered consecutively throughout the entire document. To number theorems within sections, specify this as `\newtheorem{thm}{Theorem}[section]`.
- To number a different theorem type consecutively with ordinary theorems, declare it as `\newtheorem{lem}[thm]{Lemma}`. This works with any other element with a defined counter; substitute the desired counter for `[thm]`. For example, authors wishing to number theorem-class objects consecutively with equations can specify `\newtheorem{thm}[equation]{Theorem}` and thereafter use `[thm]` as the reference counter.
- The two “reference” counters can be thought of this way:
  - `\newtheorem{environment}{Heading}[number-within]`
  - `\newtheorem{environment}[reference-counter]{Heading}`

## 4. Top matter

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

Top matter information should be input *after* `\begin{document}`.

**4.1. Summary of tags and elements.** Table 2 lists the top matter commands provided by AMS- $\text{\LaTeX}$  version 2.0 and later. Not every tag is necessary for each *Memoir*. The table shows which tags are required and which are optional. The template file included in every author package contains all the necessary tags and instructions for using them.

TABLE 2. Top matter tags for *Memoirs*

<code>\title[...]{...}</code>	required <sup>1</sup>
<code>\author[...]{...}</code>	required <sup>1</sup>
<code>\contrib[...]{...}</code>	optional <sup>2</sup>
<code>\address{...}</code>	required
<code>\curraddr{...}</code>	optional
<code>\email{...}</code>	optional
<code>\urladdr{...}</code>	optional
<code>\dedicatory{...}</code>	optional
<code>\date{...}</code>	— <sup>3</sup>
<code>\thanks{...}</code>	optional
<code>\translator{...}</code>	— <sup>3</sup>
<code>\subjclass[2010]{...}</code>	required
<code>\keywords{...}</code>	optional
<code>\maketitle</code>	required
<code>\begin{abstract}... \end{abstract}</code>	required

<sup>1</sup> If no short form is needed, omit the bracketed option.

<sup>2</sup> For contributors, see details on page 12.

<sup>3</sup> If this is necessary, it will be filled in by the AMS staff.

**4.2. Title.** Capitalize the first and last words in a 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 or the first word after a colon (:). The title should be input in a style appropriate for use in a bibliography; the style of the title that will appear in print for the particular publication will be generated automatically when the *Memoir* is processed at the AMS.

A multiline title may be left for L<sup>A</sup>T<sub>E</sub>X to break, or a desired break may be indicated by `\\`.

Avoid the use of math in titles. In particular, only these fonts are compatible with the AMS production system when used in titles: fonts in the Computer Modern family; `amsmath` with `amssymb`, and the script fonts from the `mathrsfs` package. (Other fonts may be used in the body of the work.)

**4.3. Author information.** Enter the name(s) of the author(s) with the command `\author`, using standard capitalization for proper names. Use a separate `\author` command for each author. Names will be combined by L<sup>A</sup>T<sub>E</sub>X according to the dictates of the document class. See also “contributors”, below.

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 L<sup>A</sup>T<sub>E</sub>X document classes). Do not use abbreviations in addresses.

Addresses are considered part of the top matter. Suitable labels will indicate the current, email, and URL addresses, typically *Current address:*, *Email address:*, *URL:*, respectively.

If a tilde (~) is needed in a URL address, enter it directly as ~ if you are using an AMS- $\LaTeX$  version later than 2010; otherwise, see the Author FAQ [?] for instructions.

**4.4. Contributors** (versions since 2010). Contributors are much like authors, but are responsible for only a portion of a document, 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, adding punctuation and “and” as appropriate. (For this example the result is “. . . with an appendix by William Rogers and Henry Taylor, and Appendix B by John Henderson”.) Addresses provided for contributors will be treated the same as for regular authors.

**4.5. 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 `\\`.

**4.6. 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 `\subclass`. 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.

**4.7. Subject information.** Subject classifications and key words, like titles and author names, are part of the top matter and appear as unnumbered footnotes at the bottom of the abstract page.

Subject classifications may be primary (the major topic(s) of the *Memoir*) 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

```
\subclass[2010]{Primary (primary class);  
Secondary (secondary classes)}
```

separated by commas within. Omitting [2010] will cause the 1991 Subject Classification to be cited; if an error for 2010 is reported, your version of the AMS document classes is from before 2009 and should be upgraded.

To determine the classifications, use the 2010 Mathematics Subject Classification scheme, which can be accessed on the Web at [www.ams.org/msc](http://www.ams.org/msc). 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{...}`, separated by commas, with only the first word and proper nouns capitalized.

**4.8. Abstract.** The proper location of the *Memoirs* abstract is indicated in the template in the author package.

Input the abstract text between `\begin{abstract}... \end{abstract}`. It may comprise multiple paragraphs and include unnumbered display material if appropriate. The length of the abstract depends primarily on the length of the *Memoir* 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

**5.1. Linking for the Web.** All *Memoirs* are posted online. Electronic manuscripts prepared in  $\text{\LaTeX}$  for any *Memoir* should be tagged for maximum linking on the Web. For use of `\label`, `\ref`, and `\cite`, see [MG]; for `\eqref`, see [AMG]. An AMS-specific version of the `hyperref` package will be added by AMS staff at the appropriate stage of the production process and will be applied to internal cross-references and external URLs.

**5.2. Headings.** Six levels of headings are provided to permit logical sectioning of a manuscript.

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

`\part` is the highest level, and is ordinarily used only when distinct portions of the manuscript have significantly different types of content.

The `\chapter` division is provided only for monographs. In this respect, *Memoirs* is a special case of monographs.

In chapter titles, 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 or the first word after a colon (:).

A multiline title may be left for  $\text{\LaTeX}$  to break, or a desired break may be indicated by `\.` Unless the chapter title is very short, provide an alternate form suitable for use in running heads. This should be entered in brackets between the tag `\chapter` and the full title: `\title[(short title)]{full title}`. Unlike the practice in the basic  $\text{\LaTeX}$  document classes, the optional alternate form is *not* the form used for the TOC; instead, the full form of the title is used there.

Starred heading commands (`\chapter*` and `\section*`) do not provide for a bracketed short form; if a short form is needed for running heads, use

```
\markboth{<short chapter title>}{<short chapter title>}
\markright{<short section heading>}
```

typing the heading text in all uppercase.

Do not use author-defined macros in the title.

If `\` has been used to break a chapter title, an adjustment must usually be made for the table of contents. This can be done by specifying what is to be included or omitted from the TOC as follows.

- `\except{toc}{...}` excludes material from the TOC, for example  
`\chapter{some text\except{toc}{\} the rest of the title}`
- `\for{toc}{...}` inserts an additional directive in the TOC, often an alternate linebreak command.

`\specialsection` differs from `\section` mainly in the formatting of the heading. A `\specialsection` heading will not be used as a running head.

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{Historical note}
\label{s:hnote}
```

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

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

**5.4. Lists.** Follow usual  $\text{\LaTeX}$  conventions for producing list environments.

**5.5. Theorems, lemmas, and other proclamations.** See the manual *Using the amsthm package* [ATH] 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  $\text{\LaTeX}$  `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.

**5.6. Equations.** Check displayed equations carefully, making sure they are broken and aligned following the guidelines in [Sw, pp. 44–48], and that they do not exceed the width of the page for the publication in which they are to appear. For multi-line displays, use the structures defined in the `amsmath` user’s guide [AMG].

**5.7. Equation numbering.** AMS style (and the default behavior) for display numbers is always to place them at the left margin, so that they are always in a predictable location, and thus easily found. Left placement ensures that they don't interfere with the qed box on proofs, or other similar flags. *Please note that the use of any other numbering style will be changed to accord with standard AMS practice, which may run the risk of introducing inadvertent errors.* If you have any questions about this, please contact AMS technical support; see page 29.

**5.8. Roman type.** Numbers, punctuation, (parentheses), [brackets], {braces}, and symbols used as labels should ideally be set in roman (upright) 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  $\backslash(. . . \backslash)$ . 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 AMS- $\LaTeX$  collection). The command `\eqref`, to be used for references to numbered equations, includes parentheses along with the equation number, all in roman type, e.g., `\eqref{eqn2.4}` will produce “(2.4)” (assuming that is the correct label for that equation).

**5.9. Exercises.** The `xca` environment is encouraged for producing exercises that appear individually within a section. This environment is defined in the document preamble with `\theoremstyle{definition}` and the `\newtheorem` command; it is used in a manner similar to that of any other theorem-class environment.

**5.10. Indexing.** Ideally, index terms should be included directly in the  $\TeX$  file(s) for the document, to ensure correct page references. The output resulting from  $\TeX$ ing the file should conform to the rules of *MakeIndex*. Output of this program is processable only by  $\LaTeX$ . All indexing methods described here require that the *MakeIndex* program be run separately from the  $\LaTeX$  run, and that  $\LaTeX$  then be rerun to incorporate the actual index(es).

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, and `\printindex` where you would like the index to appear. See [MG, chapter 11] and [KD, chapter 11] for use of `\makeindex`.

Answers to some common questions about indexes are given in the AMS Author FAQ [?].

If more than one index is desired, two packages are available that are compatible with AMS document classes. Do not use a glossary package for an additional index.

■ `amsmidx`. A package written at AMS, `amsmidx`, is included in the AMS- $\LaTeX$  collection beginning in 2010. Unlike most 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 additional 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 additional index file>}{<title of additional index>}
```

Note the capitalization of the `\Printindex` command.

■ `imakeidx`. The package `imakeidx` follows “normal”  $\LaTeX$  style for specifying options, unlike `amsmidx`; however, it didn’t exist when the latter was written. With `imakeidx`, no file name need be given for the main index; the name of any additional index is specified as an option. Specify the indexes in the preamble like this:

```
\usepackage[original]{imakeidx}
\makeindex % will get the same name as the main file
\makeindex[name=<name of additional index file>, title=<title of index>]
```

The `[original]` option is required to preserve the correct AMS-publication-specific formatting of the first index page.

To identify an entry for the main index in the text:

```
\index{<index term>}
```

or, for a different index,

```
\index[<name of index file>]{<index term>}
```

In the backmatter, where the indexes are to appear:

```
\printindex[<name of index file>, title=<title of index>]
```

for as many indexes as needed.

## 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 *Graphics*, page 22).



If a figure is described by L<sup>A</sup>T<sub>E</sub>X code (e.g., using `xypic`, `tikz`, or the `picture` environment), it should be included directly in the file; if the code is extensive (15–20 lines or more), it may be entered in a separate dedicated file and called in with `\input`.

### 6.1. 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; in this situation it may be appropriate to code it directly rather than as a `figure` or `table`, particularly if it is small.

Figures and tables should be allowed to float according to the L<sup>A</sup>T<sub>E</sub>X defaults preset by the document class. If you are submitting a file that will be processed at the AMS (this applies to all *Memoirs*), 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 production staff, on the basis of the most appropriate page layout.

**6.2. 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 L<sup>A</sup>T<sub>E</sub>X 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>}`.

L<sup>A</sup>T<sub>E</sub>X packages for captions may appear to work with the AMS document classes, but the caption style usually doesn’t match the AMS style.

**6.3. Centering tables and figures.** All AMS classes center the content of `table` and `figure` environments. Using `\centering` or `\begin{center}` and `\end{center}`, therefore, is unnecessary. For example,

```
\begin{table}
\caption{This is a table}
\begin{tabular}{cccc}
1&2&3&4\\
5&6&7&8\\
9&10&11&12
\end{tabular}
\end{table}
```

causes this table to be typeset:

TABLE 3. This is a table

1	2	3	4
5	6	7	8
9	10	11	12

## 7. Bibliographic references

Bibliographies may be prepared using either `amsrefs` or `BibTeX`. Methods using other packages, including `biblatex`, are not supported.

**7.1. Enhanced references.** References in *Memoirs* will be replaced by enhanced information from MathSciNet, in `amsrefs` format. If an entry is not present in MathSciNet, the style of the entry may be updated (if necessary) for consistency. When enhanced references are enabled, the author's bibliography is combined with data from MathSciNet to provide the following additional features:

- Direct links to journal articles published by the AMS (requires journal subscription).
- Article DOIs.
- Links to MathSciNet author pages (requires subscription to MathSciNet).
- More complete and standardized bibliographic information.

Enhanced references are offered to provide the researcher with greater opportunities to access information in the mathematical sciences literature. You will find that not every reference has a corresponding record in MathSciNet, so the enhancement process may result in style inconsistencies in some individual reference lists.

In addition, it is possible that in some cases, especially in older papers, a reference was published with an incorrect MR number, which would result in an incorrect reference appearing in the enhanced references. We will be grateful to have any such errors brought to our attention by sending email to [eprod-support@ams.org](mailto:eprod-support@ams.org).

**7.2. 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 L<sup>A</sup>T<sub>E</sub>X Companion* [MG, Section 13.2]. Two `BibTeX` styles are provided:

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

Both will translate references in a BibTeX input (`.bib`) file to L<sup>A</sup>T<sub>E</sub>X 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, include these instructions in the appropriate place in the input file:

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

Running BibTeX using the name of the main file will read in the `.bib` file(s) specified by the `\bibliography` statement and produce a `.bbl` file. The `.bib` file(s) may have any name(s) the author finds convenient; the `.bbl` file will have the same name as the source file from which it is input. After the bibliography has been completed (including processing by BibTeX), the contents of the `.bbl` file should be inserted into the 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 or present in distributions based on T<sub>E</sub>X Live) provides an author-year style that is compatible with the AMS document classes. This should ordinarily be used only for articles on historical topics.

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

**7.3. Using `amsrefs` to prepare a bibliography.** `amsrefs` is a L<sup>A</sup>T<sub>E</sub>X package for preparing bibliography or reference lists. It attempts to provide many of the convenient features that L<sup>A</sup>T<sub>E</sub>X and BibTeX users have come to expect without imposing all of the overhead that BibTeX entails. In particular, it has been carefully designed to encourage the preservation of structured markup of the bibliography throughout the entire lifetime of a document from rough draft to final archival version. It does this by replacing L<sup>A</sup>T<sub>E</sub>X's unstructured `.bbl` file format by a new, fully structured format. The package is compatible with the `showkeys`, `hyperref`,<sup>1</sup> and `backrefs` packages and implements the functionality of the popular `cite` package. Interoperability with BibTeX is supported via a special bibliography style file, but `amsrefs` can be used without BibTeX. Full documentation of the `amsrefs` package can be found in [AMSR].

7.3.1. *Using the `amsrefs` package.* There are three ways of using the `amsrefs` package:

- (1) Enter bibliography items directly in your L<sup>A</sup>T<sub>E</sub>X document using the `biblist` environment and the `\bib` command.
- (2) Import items from an external `.ltb` file.
- (3) Import items from a `.bib` file using BibTeX and the special bibliography styles distributed with the `amsrefs` package.

---

<sup>1</sup>Note that unlike most packages, which must be loaded *before* `hyperref`, the `amsrefs` package must be loaded *after* `hyperref` in order to work properly.

7.3.2. *Using the `amsrefs` package with `BibTeX`.* Finally, you can use `amsrefs` in conjunction with `BibTeX`:

```
\documentclass{...}

\usepackage{amsrefs}

\begin{document}

Alan Sokal~\cite{Sokal96} recommends Bourbaki's
text~\cite{Bourbaki70} for a gentle introduction to set theory.

\bibliography{nonsense}

\end{document}
```

Note two things:

- Unlike when you use `\bibselect` to import entries from an `.ltb` file, in this case the `.bbl` file *will* contain the `bibdiv` and `biblist` environments.
- There is no need for a `\bibliographystyle` command. In fact, any `\bibliographystyle` command you put in your document will be ignored. `amsrefs` will automatically invoke the correct style.

The main advantages of using `BibTeX` are:

- you can take advantage of `BibTeX`'s ability to sort your items for you, and
- you can take advantage of the large number of `BibTeX` database files already in existence.

As when using an `.ltb` file, you may wish to replace the `\bibliography` command by the contents of the `.bbl` file when you have finished compiling your bibliography.

**7.4. Preparing a bibliography without a bibliography package.** The main references section of a work is contained between the commands

```
\begin{thebibliography}{\langle model label \rangle}
\end{thebibliography}
```

This environment resolves to an unnumbered chapter, 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 of *Memoirs* and follow the examples you see there. More examples are given in [Sw].

*Reference input.* Begin each item with the command `\bibitem{\langle bibitem label \rangle}`. 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. Permissions

Authors must obtain permission for the use of any material, including graphics, photographs, and text, appearing in their Work which comes from *any* other source. Authors should use the Society's [Permission Form](#) to request permission from an author or publisher for material previously published or owned by another. Permissions must be obtained for both print and electronic rights for all editions (present and future) and must be free of any restrictions which may limit the AMS's ability for itself or through licensees to produce, publish, promote, and distribute the Work in any territory, any language, and any medium now known or hereafter discovered. If you are applying for permission using a publisher's online form, please match the AMS's requirements as closely as possible. Any permissions that include restrictions will likely result in the material being omitted from the Work.

Additional help is available from the AMS Acquisitions Department:

Acquisitions Department  
American Mathematical Society  
201 Charles Street  
Providence, RI 02904-2294 USA  
Email: [acquisitions@ams.org](mailto:acquisitions@ams.org)

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Information about copyright and permissions is available on the [Copyright and Permission Information](#) page at [www.ams.org/publications/journals/help/jourhtml-copyright-info](http://www.ams.org/publications/journals/help/jourhtml-copyright-info).

## CHAPTER 3

# Graphics

### 1. Getting started

**Please take a moment to review the material in this chapter.** Problems with graphics in production can lead to significant delays in processing and publishing your work. Graphics are critically important in conveying large amounts of complex information and by observing a few relatively simple guidelines, you can assist in the efficiency of the publishing process.

- Use a standard T<sub>E</sub>X graphics inclusion macro package. The recommended graphics inclusion package for L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> is `graphicx`. Be sure that commands used to include graphics in T<sub>E</sub>X are compatible with dvips.
- Do not place graphics for use in T<sub>E</sub>X files in subdirectories.
- Number figures consistently throughout the paper.
- Use an in-text reference.
- Set figure captions in T<sub>E</sub>X.
- Set figure captions below the figure.
- Make sure figures are sized correctly and do not extend into the margins of the page.
- Make sure that labels overlaid on a figure using a separate package do not extend beyond the space allotted to the figure.

### 2. File format

*The preferred file format for graphics is EPS (Encapsulated PostScript). Other formats will be converted to EPS at the AMS.*

- Characteristics of EPS files can be checked by an automated procedure. Individual features, e.g., the thickness of a rule, cannot be evaluated independently in a PDF graphic.

### 3. Resolution requirements for bitmap graphics

*Line art: 600 pixels per inch (PPI) at 100%.*

*Halftone: 300 PPI at 100%.*

*Combination halftone: 600 PPI at 100%.*

### 4. Size of graphics

*Create graphics at 100% of the size at which they will be printed.*

- If the figure is too large, resize the figure in a graphics program, not in T<sub>E</sub>X.
- This applies also to photographs (see section 15).

## 5. Naming files

*File names should be no longer than 20 alphanumeric characters. Do not use accented alphabetic characters. Avoid overly generic file names such as `fig01.eps`.*

## 6. Placing graphics in your document

*Use a standard  $\TeX$  graphics inclusion macro package. We recommend `graphicx`.*

## 7. Lines and rules

*Do not use a line/rule weight less than half a point (.5 point) at 100%.*

- If you must scale your figure, be sure that you compensate by making line weights thicker. A .5 point line scaled at 50% becomes a .25 point line. Lines with weights less than half a point *may* disappear during the printing process.
- Increase graded lines in half-point increments (i.e., .5 point, 1 point, 1.5 points). Otherwise, the lines will not appear as distinctly different lines.
- Give lines that are a shade of gray (screened) or colored a line weight of at least 1 point at 100%. Gray and colored lines with weights less than 1 point look broken and jagged because of the small dot pattern used to simulate a shade of gray or color tone.

## 8. Shades of gray (screens)

*Screens (a pattern of small black and white dots used to simulate shades of gray) should not be lower than 10% or higher than 85%.*

- Screens outside the range 10% to 85% are either too light or too dark to print correctly.
- Screen density should increase in increments of no less than 10%. Screen variations of less than 10% are not distinguishable.
- Do not put (black or colored) type on a screen darker than 35%. Type on a screen that is above 35% is not legible.
- White type can be used only on 100% black. White type on a gray background looks broken and jagged because a small dot pattern is used to simulate shades of gray.

## 9. Font usage

*Fonts should be fully embedded in your graphics.*

- Whenever possible, fonts used in graphics should match those used in text.
- Fonts should be fully embedded in your graphics. If the fonts are not embedded in a graphic, it is possible that the font will be replaced with a default font such as Courier and the characters will not print properly. If you are unable to embed the fonts in your graphic, convert the fonts to paths (or outlines) prior to exporting the file to EPS. The fonts can be converted in the program you used to create the graphics. (For assistance, consult your graphics program's documentation.)
- Use Type 1 outline fonts instead of bitmap fonts. Type 1 outline fonts are vector based. These fonts do not lose quality when they are output to high-resolution printers.

- Do not subset fonts included in your graphics. It is imperative that the full font set be included in every graphic. If only a subset of a font is included, a font error can occur, which may cause characters to disappear in both the graphic and the DVI file.
- Avoid using fonts with city names such as Chicago, Monaco, Geneva, etc.

## 10. Multiple-part figures

*Multiple-part figures should be configured as one figure in a graphics program, not in  $\TeX$ .*

- Aligning multiple-part figures is very difficult in  $\TeX$ . It is easier and more cost-effective to do so in a graphics program.

## 11. Cropping and bounding boxes

*Do not crop by pasting areas of white over portions of the graphic.*

- When using a smaller area of a larger graphic, clip or crop within the graphics application to delete all but the desired portion.
- Do not crop by pasting areas of white over portions of the graphic. Doing this will make the bounding box larger than it should be and will cause problems when the graphic is included in  $\TeX$ .
- If possible, verify that bounding box information is correct. If the bounding box is not correct, graphics might be clipped off in unexpected ways.

## 12. Color graphics

*Graphics submitted in color will appear in color in the online version of *Memoirs*. The print version will normally appear in black and white, except in special circumstances, when the Editor and Publisher mutually agree that color graphics are warranted. The AMS offers color to authors who are willing to pay for four-color graphics that aren't deemed essential to the mathematics by the Editor and Publisher.*

**12.1. Color spaces and gamuts.** There are two main color spaces in use: RGB (Red-Green-Blue) and CMYK (Cyan-Magenta-Yellow-Black). The former is used for light-emitting displays (computer monitors, for instance) while the latter is used for printing.

One of the characteristics of a color space, such as RGB or CMYK, is its *gamut*, the range of colors that it can reproduce. The RGB color space has a much larger color gamut than the CMYK color space, as shown in Figure 1 (page 25, left). Colors in the RGB color space that lie outside the gamut of the CMYK color space must be approximated by the CMYK color space, with varying degrees of success: Figure 1 (page 25, right) compares the color output from various color technologies. CMYK colors can generally appear more muted when compared to their RGB counterparts. All RGB color graphics have to be converted to CMYK for printing. All color graphics, both RGB and CMYK, are subjected to analysis here at the AMS and optimized for printed publication.

*Above all, bear in mind that color graphics viewed on a monitor or printed on a personal printer will not necessarily be an accurate rendering of how colors will look when printed on a press.* Our Graphic Arts group





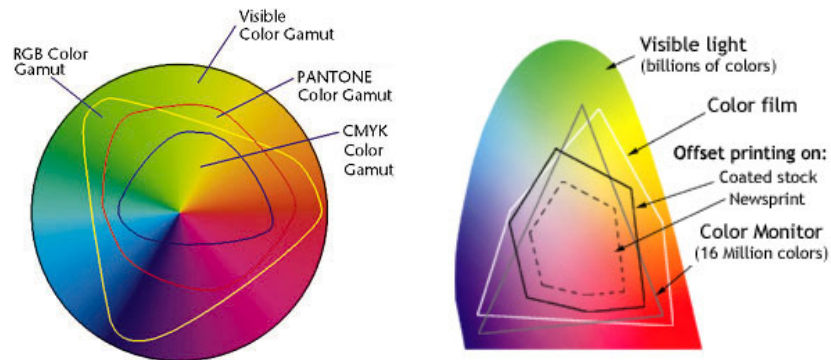


FIGURE 1. *Left:* A comparison of the colors available in various color spaces. *Right:* A comparison of the colors available with various display technologies.

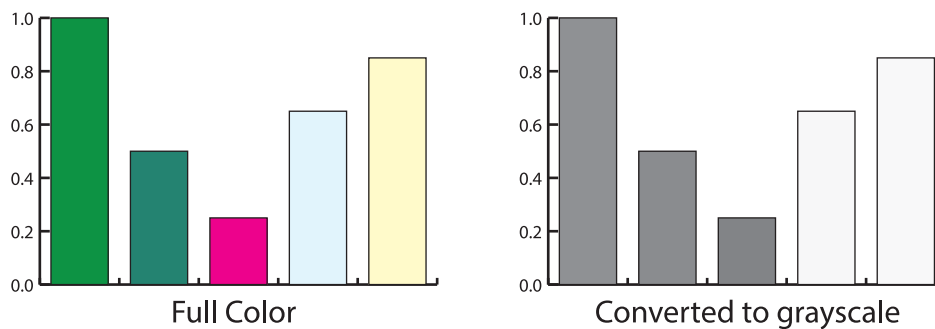


FIGURE 2. Colors don't always have the intended effect when converted to grayscale.

has years of experience in bringing out the best from a wide variety of graphics, particularly color graphics.

**12.2. Requirements for graphics to be published in color. Graphics intended to be printed in color should be submitted in CMYK format. If you submit RGB files they will be converted to CMYK.** The AMS cannot guarantee that color reproduction in the print product will match the RGB file.

**12.3. Color graphics to be printed in black and white or grayscale should be converted to black and white or grayscale before being submitted to the AMS.** When color graphics are printed in black and white or grayscale, sometimes lighter colors, such as yellow, disappear, or darker colors, such as red and blue, appear to be the same tone. It is preferable that you convert your color graphics to grayscale and check to be sure that all the elements in your graphics print as desired—see Figure 2, above. Check your color figures on a black and white printer to ensure that the black and white printout of your figure is legible.

**12.4. Shades of colors.** Inherently light colors should be handled carefully when using shades of them. Whereas 50% red turns out to be a usable pink, a 50% yellow or cyan may be almost invisible.

**12.5. Colored lines** should be no less than .5 point in width. Colored lines in inherently light colors (e.g. yellow and cyan) should always be at or near 100% in tint.

### 13. Using type in graphics

*Type within graphics requires special attention to reproduce legibly.*

- Basic type size should be no less than 10 point at 100%. Although 10-point type is acceptable for print, for graphics intended to be viewed online, screen resolution is 72 PPI and 10-point type will be difficult to read.
- Do not put type on a dark background. Dark type on dark colors is not legible.
- Check your color figures on a black and white printer to ensure that the black and white printout of your figure is legible.

### 14. Tables

*Tables can be thought of as a special kind of graphic. They often require a great deal of attention to make them effective.*

- Make sure that the width of the table does not exceed the width of the text block.
- Very wide tables can be rotated using the `rotating` package together with the `sidewaystable` environment. Remember that tables (and figures) should be rotated such that the left-hand side of the table (or figure), after rotation, is at the bottom of the page.
- Set table captions above the table.
- For more help on the formatting of tables, see [MG, chapter 5] and [voss-tbl].

### 15. Photographs

*Photographs must be at a minimum resolution of 300 dpi at the actual size that the photograph will be printed in the published product.*

- Photographs should be at least 300 dpi in resolution at the actual size that the photograph will be printed in the published product. Do not scale photographs in  $\text{\TeX}$ .
- File format can be EPS, TIFF, or JPEG.
- Color photographs must be saved in CMYK format. (See Color graphics, section 12.)

### 16. $\text{\TeX}$ graphics

There are several ways of providing graphics by the use of  $\text{\TeX}$  coding, the principal choices being

**tikz:** Based on the PGF (portable graphics format), this is a very flexible environment for creating graphics within a  $\text{\TeX}$  document. Note that it functions equally well in dvips-based  $\text{\LaTeX}$  and pdf $\text{\LaTeX}$  as well as the newer varieties of  $\text{\TeX}$  such as X $\text{\LaTeX}$  and Lua $\text{\LaTeX}$ . The native documentation [tikz] is excellent, though massive. There are two very good primers by Mertz and

Slough: [\[MeSlp\]](#) and [\[MeSlt\]](#). A large set of examples, often generously documented, can be found at [\[tkz-ex\]](#).

**pstricks:** Also a very flexible and useful environment for drawing in T<sub>E</sub>X. It is most easily used with dvips-based T<sub>E</sub>X, though, with some care, it can be used with pdfL<sup>A</sup>T<sub>E</sub>X. There is an excellent reference book by Herbert Voss, *PSTricks: Graphics and PostScript for T<sub>E</sub>X and L<sup>A</sup>T<sub>E</sub>X* [\[voss-pst\]](#). The use of pstricks is also covered in some detail in [\[GM\]](#), chapters five and six.

**xy and xypic:** Though generally associated with commutative diagrams, these packages can also serve as a general drawing environment for T<sub>E</sub>X.

A great deal of general information about other L<sup>A</sup>T<sub>E</sub>X graphics packages can be found in [\[GM\]](#).

### 17. Using a package to apply labels to graphics

Several packages exist whose purpose is to place labels on graphics. Use of such a package does ensure consistent fonts. However, labels added by such a package do not modify the dimensions of a graphic, whether it is an EPS file or a drawing prepared by other means.

If labels are applied outside the edges of the graphic, they can extend into the margin on the sides, or above or below the graphic into space intended to separate the page content from the running head, or the graphic from a caption. In extreme cases, they can overprint surrounding material, with no warning being issued. Authors using such packages should be alert to this possibility, and carefully check the graphics where such labeling has been used.

If it is not possible to position labels within the boundaries of a graphic, extra space should be added with `\vspace` to compensate.

## Submitting files to the AMS

### 1. Submission guidelines

Upon acceptance of your *Memoir*, the source file(s) should be sent to the AMS office (this includes the T<sub>E</sub>X source file(s) and any graphics files). Send *only* the files that are needed to process your submission or archive it for future reference. (This does *not* include `.log` or `.aux` files, for example.)

Before sending the source file(s), be sure you have proofread your *Memoir* submission carefully. The files that you send must be the EXACT files used to generate the copy that was accepted for publication. In order to avoid any possible production problems, before sending the files, be sure to verify all items in the sections *The basic checklist* (page 5) and *A checklist for using the Memoirs class* (page 6).

If your submission consists of **multiple files**, we recommend that you bundle them using the Zip utility; this can be obtained (free) for most platforms from [freecode.com](http://freecode.com). Bundling means that only one (compressed) file needs to be sent, lessening the chance of name conflicts or file corruption.

### 2. Web server submissions (preferred)

Accepted electronic manuscripts can be submitted via the web server at [www.ams.org/submit-book-journal](http://www.ams.org/submit-book-journal). For security and confidentiality reasons, submitting through the web server requires an AMS web account. Authors who do not already have an account will be given the opportunity to create one as they go through the submission process.

### 3. Electronic mail submissions

Files sent by electronic mail should be addressed to `pub-submit@ams.org`. Include them as attachments, not as part of the message.

The subject line of the message should use the publication code to identify the as a *Memoirs* submission. By including this information in the subject line, you will help speed up the processing of your submission.

Submissions received through email will be acknowledged upon receipt by an automatic reply while your submission is reviewed. If there are any problems with the file received, you will be notified.

### 4. Other possibilities

If your attempt to submit both through the web server and by electronic mail fails, other arrangements are available. Send email to [AMS Technical Support](#) as described in the section “[Getting help: AMS resources](#)” on page 29.

## Resources and getting help

### 1. Getting help: AMS resources

Many questions raised by authors are answered in the AMS Author FAQ [?]. 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 AMS Technical Support:

Publications Technical Group  
 Phone: 800-321-4267, ext. 4080 or 401-455-4080  
 Email: [tech-support@ams.org](mailto:tech-support@ams.org)

All written correspondence should be sent to the appropriate AMS department at:

American Mathematical Society  
 201 Charles Street  
 Providence, RI 02904-2294 USA

or by FAX to 401-331-3842.

See submission instructions on the web starting from  
[www.ams.org/arc/journals/journal-submit.html](http://www.ams.org/arc/journals/journal-submit.html)

Problems in accessing the web server should be reported to:

Email: [webmaster@ams.org](mailto:webmaster@ams.org)

### 2. T<sub>E</sub>X resources

L<sup>A</sup>T<sub>E</sub>X and T<sub>E</sub>X are available on the web free of charge. There are also several commercial T<sub>E</sub>X implementations. AMS web pages devoted to T<sub>E</sub>X information can be accessed at [www.ams.org/tex](http://www.ams.org/tex). The first of these pages has links to other pages that identify the various sources for the T<sub>E</sub>X program.

L<sup>A</sup>T<sub>E</sub>X is the most popular of the free front ends designed for use with T<sub>E</sub>X, the basic typesetting program. Whereas plain T<sub>E</sub>X defines basic macros, L<sup>A</sup>T<sub>E</sub>X defines stylistic packages, setting up styles for a monograph, journal article, and article in a proceedings collection, which you can then alter to your own specifications.

AMS-L<sup>A</sup>T<sub>E</sub>X is a collection of L<sup>A</sup>T<sub>E</sub>X extensions that make various kinds of mathematical constructions easier to produce and take more care with certain finer details in order to yield publication-quality results. It consists of two parts: `amsmath` (the part concerned with the mathematics) and `amscls`. The latter is a collection of companion design setup packages (variously referred to as ‘document class’ or ‘class’ files) that enable authors writing a monograph or article to get largely the same visual appearance in their preliminary drafts as in a final publication with the

AMS. Both parts of AMS- $\LaTeX$  are included in the canonical  $\LaTeX$  distribution as part of  $\TeX$  Live.

Updates for `amsmath` are best obtained from CTAN; updates for `amscs` can be obtained either from CTAN or from the AMS web server at [www.ams.org/tex](http://www.ams.org/tex). Other AMS packages and collections are the AMSFonts and `amsrefs`. These too are included in  $\TeX$  Live as well as available from both the AMS web server and CTAN. All distributions include a copy of the relevant User's Guide and other related documentation in PDF form, which can either be printed or viewed electronically. (This Author Handbook is the User's Guide to the `amscs` collection.)

The book *More Math into  $\LaTeX$*  [Gr] is written from the point of view of a mathematician using AMS- $\LaTeX$ , and contains many examples. The *Guide to  $\LaTeX$* , fourth edition [KD], is a good general introduction to  $\LaTeX$ . The original and authoritative manual for  $\LaTeX$  is the  *$\LaTeX$  User's Guide & Reference Manual* [La]. George Grätzer has also written a series of articles for *Notices of the AMS* [Gr1, Gr2, Gr3, Gr4, Gr5, Gr6, Gr7] that keeps the interested user up-to-date with the latest developments in  $\LaTeX$ .

Another source of information on  $\TeX$  and  $\LaTeX$  is the  $\TeX$  Users Group (TUG). They can be contacted at:

**$\TeX$  Users Group**  
 P. O. Box 2311  
 Portland, OR 97208-2311  
 (503) 223-9994, FAX: (206) 203-3960  
[office@tug.org](mailto:office@tug.org)

TUG also distributes the  $\TeX$  Live collection, which includes ready-to-run implementations of  $\TeX$  for Windows, Mac, and Unix platforms, as well as  $\LaTeX$  and an extensive selection of packages, all freeware.

### 3. Online assistance

One of the best places to ask for assistance is the group known by the acronym CTT, [groups.google.com/forum/comp.text.tex](http://groups.google.com/forum/comp.text.tex). Most of the people who use CTT are more than willing to answer questions and give advice.

Another online source of assistance is [tex.stackexchange.com](http://tex.stackexchange.com). This is organized differently from most discussion groups. After signing up, you pose and answer questions. In the process, you gain points which in turn allow you to do more in the group. Be sure to read [tex.stackexchange.com/about](http://tex.stackexchange.com/about) to get you started.

The AMS is not equipped to handle questions about specific platforms. Links to sites providing such support, as well as addresses for discussion lists and links for online forums, are given on this AMS web page:

[www.ams.org/tex/additional-sources](http://www.ams.org/tex/additional-sources).

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Discounts are available on some of these books when they are ordered using information available on the T<sub>E</sub>X Users Group page [Books about TeX and Friends](#). In particular, books published by Pearson affiliates (including Addison-Wesley) are eligible for a discount.

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