

Using `jloganal.cls`: **L^AT_EX** instructions for authors

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`jloganal.cls` is the public version of the class file used to format papers in the Journal of Logic and Analysis and is intended for use by authors submitting articles. This document serves both as a set of instructions for using `jloganal.cls` and as a set of general instructions and hints for writing articles in L^AT_EX for submission to JLA. It has been adapted, with kind permission from the original author, from a similar document written by Colin Rourke for submissions to the Geometry and Topology series of publications (GTP). The class file `jloganal.cls` itself is a modification of the class file used by GTP. Thanks are due to Colin Rourke for granting these permissions.

1 Basics

Authors are expected to submit articles in well-structured L^AT_EX. This means at a minimum the following:

- (1) Bibliography structured using standard L^AT_EX syntax (or generated by BibT_EX) with citations made using the `\cite` command in one of the standard forms `\cite{Dold87}` or `\cite[Theorem 3.7]{Dold87}`
- (2) Figures and tables allowed to float (unless small—say 1 inch maximum height) by using the `{figure}` or `{table}` environments
- (3) Sections, subsections, figures etc, labelled using `\label` and cross-referenced using `\ref`
- (4) Numbered theorems, remarks, definitions etc, set out using proper environments (defined using appropriate `\newtheorem` commands) and also labelled with `\label` and cross-referenced using `\ref`
- (5) Equations, where numbered, also labelled and cross-referenced using `\label` and `\ref`

- (6) Multi-line equation displays set out using an appropriate environment (examples: `{eqnarray}`, `{align}`, `{gather}`)

These points are far more important than using `jloganal.cls`. It is comparatively easy to reformat a well structured file. But adding properly structured cross-references, for example, is time-consuming and liable to introduce errors.

2 Layout of metadata etc

To convert a well-structured \LaTeX file to use `jloganal.cls`, you need to change the class declaration at the top of the document and to reorganise the metadata items (title, author(s), address(es), etc). Here is an example of the start of a file, including metadata, laid out in the correct format:

```
\documentclass{jloganal}

\usepackage{pinlabel}

%%% Start of metadata

\title[An airy sample]{An airy sample\\for demonstration purposes}

% First author
%
\author[J\R Smith]{James R Smith}
\givenname{James R}
\surname{Smith}
\address{Department of Mathematics\\
The University of the Air\\newline
27 However Road\\Coalsport CL65 7UL\\UK}
\email{jrs@maths.air.ac.uk}
\urladdr{http://www.maths.air.ac.uk/~jrs}

% Second author
%
\author[W von Jones]{William von Jones}
\givenname{William}
\surname{von Jones}
\address{Department of Mathematics\\
The University of Fire\\newline
59 Wherever Road\\Dinkington DK25 6AR\\UK}
\email{w.jones@maths.fire.ac.uk}
```

```

\urladdr{}
%
% Add a similar block for other authors
%

\keyword{air}
\keyword{fire}
\keyword{five elements}
\keyword{sample}
\subject{primary}{msc2000}{58M56}
\subject{primary}{msc2000}{59Q23}
\subject{secondary}{msc2000}{22X99}
\subject{secondary}{msc2000}{21Y73}
\subject{secondary}{msc2000}{18Q18}

\arxivreference{math.AW/0611679}
\arxivpassword{5spud}

% Leave the following items blank
%
\volumenumber{}
\issuenummer{}
\publicationyear{}
\papernumber{}
\startpage{}
\endpage{}
\doi{}
\MR{}
\Zbl{}
\received{}
\revised{}
\accepted{}
\published{}
\publishedonline{}
\proposed{}
\seconded{}
\corresponding{}
\editor{}
\version{}

%%% End of metadata
%
%%% Start of user-defined macros %%%
% The following are what you would insert if your Theorems in LaTeX

```

are written as

```
% \begin{thm} ....

%\end{thm}
% and similarly for Lemmas: \begin{lem} ..... \end{lem}

\newtheorem{thm}{Theorem}[section]
\newtheorem{lem}[thm]{Lemma}
\newtheorem*{zlem}{Zorn's Lemma}
%
\theoremstyle{definition}
\newtheorem{defn}[thm]{Definition}
\newtheorem*{rem}{Remark}
%
%
\numberwithin{equation}{section}
\makeop{Homo}
\newcommand{\bbl}{\mathbb{L}}

%%% End of user-defined macros %%%

\begin{document}

\begin{abstract}
This is a short abstract inserted just for demonstration purposes.
You can use mathematical statements eg  $\text{Homo}(G)\text{iso}\Gamma$  but
NOT environments inside the abstract. If you really must use an
environment (eg an itemized list) then enclose it in braces.
\end{abstract}

\begin{asciiabstract}
This is a short abstract inserted just for demonstration purposes.
You can use mathematical statements eg  $\text{Homo}(G)$  is isomorphic to
 $\Gamma$  but NOT environments inside the abstract. If you really
must use an environment (eg an itemized list) then enclose it in
braces.
\end{asciiabstract}

\maketitle

%%%%%%%%%%%%%% Start of main body of article
```

Let's go through this example in detail. To save you time and trouble, you can obtain a template (this will be downloadable from the JLA website "For authors" section in

due course) from Nigel Cutland at

nc507@york.ac.uk

which contains blank versions of all the entries above (plus a few extra comments).

Add any necessary packages immediately after the class declaration. Note that `amsthm`, `amssymb` and `amsmath` are already loaded, so there is no need to add any of these. The given example `pinlabel` is covered in [Section 6.3](#). Other examples might be:

```
\usepackage{graphicx}  %%% the recommended graphics package
\usepackage[all]{xy}
\usepackage{amscd}
```

The metadata which follows is mostly self-explanatory. There are optional arguments for both `\title` and `\author` which are used in running heads. If no options are given, the ordinary title and author are used instead. In the example given above, odd pages would carry the head “*An airy example*” and even pages “*JR Smith and W von Jones*”. Use `\\` to separate “lines” of the mailing address and to break a long title into lines (better done manually than automatically). Addresses are printed at the end of the paper with commas to separate “lines”. The use of `\newline` will force a line break in the printed address.

Give a separate block of metadata for each author, using the same layout. For an appendix author use the format:

```
\author{{\rm Appendix:} John Evans}
```

Each keyword or phrase should have a separate `\keyword{}` entry and each subject class a separate `\subject{}{}{}` entry following the examples given. Keywords are not printed, but appear in the web site and also get used for indexing purposes.

If your paper is stored in the arXiv then please supply the reference and password (the password for the paper—five characters, lowercase letters and numerals—NOT your personal password on the arXiv).

After the metadata come your macros. `\newtheorem` declarations come first and are covered in [Section 3](#), then the other macros. For comments on the examples given see [Section 4.2](#), [Section 7.1](#) and [Section 8](#).

Then comes `\begin{document}` followed by the abstract and `\maketitle` after which the main body of the text starts. Supplying an ascii translation of the abstract is optional, but bear in mind that it must be easily readable, eg “Homo(G) is isomorphic to Gamma” is easily read whilst “`\Homo(G)\iso\Gamma`” is not!

2.1 Article “mock-up”

As a convenience to authors, you can make `jloganal.cls` produce a full “mock-up” of a published article, which uses the same running heads and feet as in the actual journal (with dummy pagination and dating). To do this add the line (uncommented):

```
%\jlaart
```

near the start of the paper (eg after the `\usepackage` commands).

Important note Please do not place your article in a public place (eg on the arXiv) in “mock-up” form unless it has been accepted for publication in the relevant journal.

3 Theorem declarations

Theorem style is set by the `amsthm` package. If you are familiar with the facilities offered by this package, then skim through this section and start reading again at [Section 4](#).

Using `amsthm`, the `\newtheorem` declarations are exactly the same as in other L^AT_EX styles with one exception. There is a variant `\newtheorem*` which provides a theorem-like environment without numbering the theorem. This is useful for remarks, named theorems (eg Zorn’s Lemma) etc. `\newtheorem` declarations are controlled by the current “theorem style”. Thus if you type

```
\theoremstyle{definition}
```

then subsequent `\newtheorem` declarations will define theorem-like environments in the “definition” style. There are two predefined theorem styles provided by `jloganal.cls`:

- (1) `\theoremstyle{plain}` which has heading bold and left justified, optional note bracketed in roman type and statement in slanted type.
- (2) `\theoremstyle{definition}` alias `\theoremstyle{remark}` which has heading bold and left justified, optional note bracketed in roman type and statement also in roman type.

`\theoremstyle{plain}` is recommended for theorems, lemmas, corollaries etc and is the default style, whilst `\theoremstyle{definition}` is recommended for definitions, remarks etc.

Here are some sample `\newtheorem` declarations:

```
\newtheorem{thm}{Theorem}[section]      % (1)
\newtheorem{lem}[thm]{Lemma}            % (2)
\newtheorem*{zlem}{Zorn's Lemma}        % (3)
\theoremstyle{definition}
\newtheorem{defn}[thm]{Definition}       % (4)
\newtheorem*{rem}{Remark}                % (5)
```

In order these define

- (1) a standard theorem environment with numbering of the style **7.3** (result number 3 in section 7),
- (2) a standard lemma environment with numbering consecutive to theorems,
- (3) a special unnumbered lemma called **Zorn's Lemma**,
- (4) a numbered definition environment with numbering consecutive to theorems and lemmas,
- (5) an unnumbered environment for remarks.

Note that (1), (2) and (3) are in default style `\theoremstyle{plain}` and this does not need to be declared.

Here are some samples in order:

Theorem 3.1 (Sample 1) *This is the first theorem.*

Lemma 3.2 (Sample 2) *This is the first lemma.*

Zorn's Lemma (Sample 3) *Here is Zorn's Lemma.*

Definition 3.3 (Sample 4) This is the first definition.

Remark (Sample 5) This completes the samples.

These were typed:

```
\begin{thm}[Sample 1]\label{thm:sample1}
This is the first theorem.\end{thm}
\begin{lem}[Sample 2]
This is the first lemma.\end{lem}
\begin{zlem}[Sample 3]
Here is Zorn's Lemma.\end{zlem}
\begin{defn}[Sample 4]
```

```
This is the first definition.\end{defn}
\begin{rem}[Sample 5]
This completes the samples.\end{rem}
```

You can use `\swapnumbers` (before your `\newtheorem` declarations) to reverse the number and theorem name; this produces a layout like this:

3.3 Definition (Sample 4) This is the first definition.

Using `\swapnumbers` is a good idea if sub(sub)sections and theorems share a counter, because then the numbers will all line up at the left margin making for easy navigation.

For more on allowable numbering schemes, see the next section.

4 General points of style

4.1 Basic layout

If you are using `jloganal.cls` to write an article for GT or AGT or GTM then:

*Do not use any commands which alter page height or width or line-spacing
or the headline or footline*
eg `\textheight`, `\textwidth`, `\baselinestretch` or `\pagestyle`.

If you are reformatting an existing article, then delete any such commands. Please avoid forced vertical space as far as possible, eg, `\medskip`, `\vspace{}` etc. The basic layout and the recommended environments have the right vertical space built into them and no additional space should be necessary. There is an exception to this rule, which is when you are “faking” an environment (see below).

Please do not use automatically generated tables of contents (`\tableofcontents`). You are encouraged to give a structured outline of your paper if you wish, but please use *internal numbering* not page numbers for referencing (in other words type in subsection `\ref{sub4.3}` we prove ... *not* on page `\pageref{blah}` we prove ...). The reason for this is that it may be necessary to vary the fonts used when compiling a paper (eg when uploading to the arXiv) and page references would not be preserved.

We don’t allow `\thanks` in the metadata. Authors are encouraged to have a subsection called “Acknowledgements” where these should be put. Provide one if necessary, either at the end of the introduction or at the end of the paper.

4.2 Numbering

A wide variety of numbering schemes is acceptable. If you look at a recent JLA paper you will quickly get an impression of the styles that we are happy with. The “standard style” has theorems numbered within sections (as in the examples above) and with separate counters for equations, figures, tables and sub(sub)sections. JLA style has equation numbers left justified and bracketed. If this causes confusion (eg within an enumerated list) then it might be sensible to number equation within sections by using the command:

```
\numberwithin{equation}{section}
```

If you do this then the style will automatically use an en-dash in the equation number:

(3–5)
$$y = \int x^2$$

which makes equation numbers visually distinct from subsection and theorem numbers.

4.3 Sharing counters

Typically results and definitions share the same counter as in the “standard style” mentioned above. If you wish, you can share counters between theorems and sub(sub)sections by using for example:

```
\swapnumbers
\newtheorem{thm}[subsection]{Theorem}
\newtheorem{lem}[subsection]{Lemma}
```

The `\swapnumbers` is optional, but it makes the shared counters all line up at the left margin producing a neat coherent layout for this scheme. You can force equations to use the same counter with the code:

```
\makeatletter
\let\c@equation\c@subsection
\def\theequation{\bf \thesubsection}
\makeatother
```

The use of bold face for the equation number makes all the shared numbering look consistent. For an example of a paper sharing counters in this way, see [1]. However never share counters between fixed and floating material (`{table}` or `{figure}` environments). This can cause the numbering to fail to be sequential and make it difficult for a reader to find an item.

4.4 Faking layout

Sometimes it is useful to fake a theorem environment (for example to restate a theorem in another section). Here is an example:

Theorem 3.1 *This theorem was the first sample given above.*

This was typed:

```
\medskip
{\bf Theorem \ref{thm:sample1}}\qua
{\sl This theorem was the first sample above.}
```

```
\medskip
```

Note `\qua` is a space command equal to 3/4 of a quad.

4.5 Citation style

The Bib_T_EX house style file is `jloganal.bst` which can be obtained from Nigel Cutland and will shortly be available for download from the JLA website “For authors” section.

If a paper cited in the bibliography has a DOI this MUST be provided as part of the reference. The reason for this is that all JLA papers will be provided with a DOI which will be registered with CrossRef, who make this a requirement for their service.

However you can prepare your file using any biblio style you please. It will be converted to house style automatically as part of the production process. Journal style uses numerical citations with references collected at the end of the paper and listed in alphabetical order of authors. Each item in the bibliography *must* be cited at least once in the paper.

Please specify the author(s) of each citation where this is not clear from context. In other words type “by Kirby–Siebenmann [5]” or better “by Kirby and Siebenmann [5]” *not* just “by [5]”. This is for the convenience of readers who do not wish to keep referring to the bibliography. Use your common sense about where this becomes unnecessary (eg where a particular paper has been cited recently or where the argument is dense and not likely to be browsed by a casual reader).

The kind of bad style that we want to avoid is a line like this in the introduction:

“For more examples of this see [2, 3, 4, 8].”

which should be replaced by for example:

“For more examples of this see Gay [2], Gay and Kirby [3], Hempel [4] and Morava [8].”

Where possible use the form [5, Theorem 3.4], typed `\cite[Theorem 3.4]{KS1}`, *not* [5] Theorem 3.4 or [5, Thm. 3.4]. In other words avoid abbreviations and include results as part of the citation.

Make sure `\cites` as theorem notes have the right font (upright) and spacing and are not double bracketed. For this use a hack like this:

```
\begin{thm}{\rm \cite{KS1}}\qua .... \end{thm}
```

Don’t use unnecessary double brackets, ie, use [5] *not* ([5]) (typed `\cite{KS1} not (\cite{KS1})`).

4.6 Proof style

This is set by `amsthm` and adapted to journal style. Start a proof with `\begin{proof}` and end with `\end{proof}`. If you want to start the proof with the name of the result being proved, use:

```
\begin{proof}[Proof of \fullref{th:main}] ...
```

instead of `\begin{proof}`.

`\end{proof}` places a square \square at the right-hand margin at the end of the proof. If the last thing in the proof is a displayed equation or an enumerate, type `\proved` before the closing `$$` or `\end{enumerate}`. This moves the square up and avoids a blank line. For hints on how to deal with more difficult cases (eg if the formula has a tag or is part of an alignment) see [Section 7.5](#).

5 Punctuation, abbreviation, spelling

5.1 Hyphens

JLA style distinguishes between hyphens (typeset `-`), en-dashes (typeset `--`) and minus signs (typeset `$-$`). $\text{T}_{\text{E}}\text{X}$ uses different lengths for all three (the minus sign is a little longer and heavier than the en-dash). The minus sign is used only in maths. Some care

is needed to decide between hyphens and en-dashes. The convention JLA has adopted here is the one used by CUP, which is this: Double-barrelled words, names, etc, have hyphens eg Ffiona-McCarthy. The hyphen is also used for word breaks (automatically). Conjoined words have en-dashes eg “The Neumann–Swarup treatment of the canonical decomposition”, as do page ranges (41–50). Thus “The Ffiona-McCarthy Theorem” and “The Ffiona–McCarthy Theorem” have different meanings. In the first there is one author with a double-barrelled name and in the second there are two authors. The justification of this is that the en-dash conceals hidden words; the treatment is by Neumann and Swarup not by Neumann-Swarup.

This usage is extended into phrases with combine mathematics with English, which are uniformly regarded as conjoined not double-barrelled. Examples are $SO(n)$ –bundle, Spin^c –structure, $(n - 1)$ –manifold). Thus 3–manifold *not* 3-manifold. This extension is open to discussion, in that 3-manifold probably looks better than 3–manifold; but on the other hand $(n - 1)$ -manifold looks awful whilst $(n - 1)$ –manifold is acceptable; so for consistency it is sensible to use en-dashes throughout. Again this convention can be justified as concealing hidden words.

The other use of the en-dash is to join two equally balanced words. For example “The Torus–Annulus Theorem” is correct, but *not* semi–continuous which should be semi-continuous. To decide whether a particular hard case should in fact be an en-dash or a hyphen, ask whether the two words being joined could be reversed with much the same meaning. Yes: en-dash, no: hyphen.

Em-dashes (typeset ---) should only be used to isolate subphrases (much the same as brackets). The correct usage is without space:

“We would like to point out—without going into too much detail—that there is a subtle point here.”

But the following (using spaces and en-dashes) is also acceptable:

“We would like to point out – without going into too much detail – that there is a subtle point here.”

Not acceptable are em-dashes or hyphens with spaces: “point out — without” or “point out - without”.

5.2 Sentence structure

Please make sure that every sentence is terminated by a full stop (US: period) or a colon. It is very bad practice to run a sentence into a theorem statement without punctuation. *Never* type for example:

“... we continue with

Lemma 5.1 *If $e = 2$ then $\pi = 3$.*”

Complete the sentence before opening the lemma:

“... we continue with the following lemma.

Lemma 5.1 *If $e = 2$ then $\pi = 3$.*”

or at a pinch:

“... we continue with:

Lemma 5.1 *If $e = 2$ then $\pi = 3$.*”

But perhaps nothing is needed before stating the lemma. It is obvious that you are continuing with this lemma and there is no need to waste words telling us! A lot of short connecting sentences are just the verbal equivalent of clearing your throat or saying “erm” and best simply omitted.

5.3 Punctuation and abbreviation

The standard dictionary used by JLA is Chambers Dictionary which makes a serious effort to keep up with modern English (both US and British) usage. In particular Chambers lists most common abbreviations together with punctuation. For example, ie and eg do not carry full stops in modern usage (though i.e. is listed as a second alternative). Whilst on the subject of abbreviations, most of these are ugly and it is always acceptable to use the full form. Thus “see Theorem 3.7” *not* “see Thm. 3.7”. The space saved by this kind of abbreviation is small and makes the paper look like a set of notes. Similarly “pages 47–50” is preferable to “pp. 47–50” and the same goes for other abbreviations of these types. Don’t use full stops with initials, thus “A N Other” *not* “A.N. Other”. Separate multiple initials with a thin space by typing: A\,N Other.

Our attitude to punctuation in general is that it should not be overused. Multiple commas separating each and every subphrase are unsightly and unnecessary. In general, if a comma is not needed for sense or natural rhythm then omit it. For example in short lists do not use a comma before the final “and”. Thus “by equations 2.1, 2.2 and 2.3” *not* “by equations 2.1, 2.2, and 2.3”. The “and” serves adequately to separate the final pair and the comma is unnecessary. (This topic—known as the “serial comma”—is a thorny one and you will find some amusing comments in the Wikipedia article on the subject. If you consult this article, then bear in mind that we use “Guardian style”.)

Note that tabulated lists do not need any punctuation unless they are part of a bigger sentence. The layout serves the job of the punctuation. For example:

“We now list the properties that our scheme should satisfy.

- (1) Closure
- (2) Associativity
- (3) Unit”

5.4 Punctuation with displays

Watch carefully punctuation around displayed equations. The simple rule is that every sentence must be correctly terminated. Thus if the sentence runs into a display, then it must be terminated either before or at the end of the display. The usual practice (and quite acceptable) is eg:

“We deduce

$$x = y.$$

It follows that . . . ”

But also allowed is:

“We deduce:

$$x = y$$

It follows that . . . ”

The second style (with colon before) is ideal when the displayed equation is complicated and there is no good place to put the full stop.

Of course the following is fine:

“We deduce

$$x = y$$

and hence . . . ”

when the sentence runs on past the equation, though a comma at the end of the equation would also be fine:

“We deduce

$$x = y,$$

and hence . . . ”

Don't put punctuation after a large display or a diagram or big bracket. This always looks unsightly and can leave the reader wondering if the punctuation has some mathematical meaning. If it's a comma, it can simply be deleted (the display itself performs the function of the comma); if a semicolon or a full stop, it can be replaced by a colon before the display (if a semicolon, start the next line with a capital letter because the colon terminates the previous sentence).

5.5 Spelling

JLA allows both UK and US English spelling but it must be consistent within a paper. Thus if you use fiber or center, then use metrizable etc. If fibre, then centre and metrisable etc. Chamber's dictionary lists both US and UK spellings.

6 Graphics

JLA expects to maintain a very high standard in all graphical content.

Figures should be prepared electronically unless this is completely impracticable. If hand drawn, they must be of publication quality and scanned at high resolution. Figures containing bitmaps should be generated at the highest possible resolution.

Please prepare an Encapsulated PostScript (eps) file for each figure. We recommend `xfig` as a general purpose drawing program. This is capable of exporting in a number of formats, including eps. But many other drawing tools such as Adobe Illustrator and Aldus FreeHand can produce eps output as can programs like GnuPlot, Maple and Mathematica. Please submit the source file if using `xfig` (the source file is the `.fig` file), GnuPlot, Maple or Mathematica.

6.1 Including a figure

To include your figure in your file, use the `graphicx` package and the `{figure}` environment. Add one of the lines:

```
\usepackage{graphicx}  
\usepackage{pinlabel}
```

at the top of your file (`pinlabel` is discussed in [Section 6.3](#) and automatically loads `graphicx`) and include your figure using code such as the following:

```

\begin{figure}[ht!]
\begin{center}
\includegraphics{fig1}
\caption{This is our first figure}\label{fig:first}
\end{center}
\end{figure}

```

This allows the figure to float to the top of the next page if there is not room where it is placed. Note that you should *not* give the file extension. `graphicx` will automatically look for `fig1.eps`.

6.2 Figures and pdf_lat_ex

If you compile your file using pdf_lat_ex (see [Section 7.3](#) for a good reason to do this) then you need to create .pdf versions of your figures. Use `epstopdf` for this eg:

```
epstopdf fig1.eps
```

Do not use the similar sounding program `eps2pdf` which changes the bounding box.

If you do use pdf_lat_ex then nevertheless *send us the .eps version of your figures*. We will need these if labels need adjusting and we can readily generate .pdf versions.

6.3 Labels

JLA labels figures using T_EX labels which accurately match the text wherever this is practicable. Since we compile with pdf_lat_ex this limits the labelling programs which are suitable (eg `rlepsf` and `psfrag` do not work correctly with pdf_lat_ex). The most robust way to label (and the one that we use) is to use the labelling package `pinlabel` which we have written specifically for labelling figures for submission to JLA. This package is very easy to use, and comes with full documentation. Both package and documentation are available from the CTAN servers and included with the latest versions of MikTeX and tex-live distributions.

If you are using `xfig` then output your figure *without labels* as an eps file and then add the labels afterwards. This produces far better results than using the combined `eps+latex` picture output. Even if you are used to using combined output from `xfig`, you will quickly master the use of `pinlabel` and produce better and faster results. The `pinlabel` documentation contains many useful hints about graphics as well as instructions for using `pinlabel` and it is a good idea to read a copy alongside these instructions.

Please typeset your labels `\small` (to match the caption size set by `jloganal.cls`) if possible. Smaller (eg `\tiny`) is acceptable if there is not room for small labels, but please maintain a consistent size within any particular figure.

7 Fine points

7.1 Misuse of math italic

Math italic should not be used for words (or abbreviated words) in mathematical formulae. For example:

$x \in \textit{Homo}(G)$ typed `$x\in \textit{Homo}(G)$`

is wrong – the *Homo* looks badly spaced (and is). The correct way to type this is: `$x\in \mathrm{Homo}(G)$` which gives $x \in \mathrm{Homo}(G)$.

Or better (especially if such things occur frequently) is to define

```
\newcommand{\Homo}{\mathrm{Homo}}
```

and type `$x\in \Homo(G)$`. You can define new operator names with `\makeop` thus `\makeop{Homo}` does much the same thing (but gets the spacing rather better). `\makeop{Homo}` is an abbreviation for:

```
\def\Homo{\mathop{\mathrm{Homo}}\nolimits}
```

Important Do not define `\makeop{span}` or redefine `\span` in any way!

7.2 Spacing in mathematics

Do not necessarily take (La)TeX's mathematics layout as perfect. Judicious use of the spacing commands `\,`, `\;`, `\!`, `\thinspace`, `\negthinspace`, `\quad`, `\qquad` (see the T_EXbook [6]) can sometimes make a considerable improvement to the layout of a formula. There is one trap that T_EX-users often fall into and which is of particular relevance to topologists. T_EX treats the colon `:` as a relation and a formula such as $f : X \rightarrow Y$ gets incorrectly typeset with too much space between the f and the `:`. The following simple macro (which is supplied by `jloganal.cls`) can be used to correct this

```
\def\co{\colon\thinspace}
```

Then `$f\co X\to Y$` will be correctly spaced thus: $f : X \rightarrow Y$.

T_EX also treats the symbols $<$ and $>$ as relations. A common mistake is to use these symbols as angle brackets which results in unsightly spaces. T_EX provides `\langle` and `\rangle` for use as angle brackets which give the correct spacing.

7.3 pdf_latex and microtype

The journal uses pdf_latex for final production. If you use it to compile your article then you can use the `[microtype]` option with `jloganal.cls` which considerably improves layout and makes your article more closely approximate the final published article. To set this up modify the `\documentclass` declaration to:

```
\documentclass[microtype]{jloganal}
```

You will need to have a fully updated tex distribution installed for microtype to work correctly. If it is working, you should notice an improvement in line filling and get fewer overfull hboxes. You can tell for sure if it is installed correctly by comparing the file size of the final pdf output. With microtype installed, file sizes are roughly doubled!

Whilst on the subject of approximation to the final published article, please note that the fonts used in production are not quite the same as those used by `jloganal.cls`. This is because we use commercial fonts for the mathematics, resulting in a better layout. This has the unfortunate side-effect that page and line breaks may vary from those in your prepared file.

7.4 Multiple equation layout

A sequence of displayed equations should be typed using the `{gather*}` environment (the `*` suppresses equation numbers; use `{gather}` if you need the numbers) thus:

```
\begin{gather*}
x=y\quad\text{the first equation}\\
y=z^2\quad\text{the second \ldots and so on}
\end{gather*}
```

which yields the following layout:

$$\begin{array}{ll} x = y & \text{the first equation} \\ y = z^2 & \text{the second \ldots and so on} \end{array}$$

Compare this with the result of just using `$$` . . . `$$` for each equation:

$$x = y \quad \text{the first equation}$$

$$y = z^2 \quad \text{the second} \dots \text{and so on}$$

If you have short connecting words, then these will cause even worse spacing:

$$x = y$$

hence

$$y = z^2.$$

Correct this but setting the connecting word as an equation tag using `\tag*` thus:

```
\begin{gather*}
x=y\\
\tag*{\text{hence}}y=z^2.
\end{gather*}
```

with this result:

$$x = y$$

hence

$$y = z^2.$$

The topic of multiple line equation displays needs more thorough treatment than these quick comments. Refer to the L^AT_EX companion [7] or the T_EXbook [6] for hints on the use of `\eqalign` (plain T_EX command provided by `jloganal.cls`) or the `{align}` environment of `amsmath` (all `amsmath` commands are available with `jloganal.cls`).

7.5 End of proof symbol placement

As promised, we now return to the problem of getting the end-of-proof symbol \square to be correctly placed with alignments and other difficult cases.

There are commands `\eqaligntop` and `\eqalignbot` which are counterparts of `\eqalign` with the baseline matching the first or last line of the alignment, respectively. So you can place the end-of-proof symbol correctly with a multi-line display by typing:

```
$$ \eqalignbot{line 1 \cr line 2 \cr}\proved $$
```

This only works if there are no tags in the alignment. If there are tags then you have to use a hack. The command `\qedsymbol` typesets the end-of-proof symbol and you can place it by hand. For example if you type:

```
\begin{equation}
x=\int_0^\infty y^3 \rlap{\hspace{2in}} \qedsymbol
\end{equation}
```

the result is:

$$(1) \quad x = \int_0^\infty y^3 \quad \square$$

By varying the `\hspace` you can get a better positioning of the symbol. However you need to suppress usual end-of-proof symbol which comes from `\end{proof}`. To do this replace the corresponding corresponding `\begin{proof}` with `\proof` and omit the `\end{proof}`. This works because `\proof` opens a proof environment without alerting L^AT_EX's environment checking procedure, so it doesn't need to be closed! (You can do a similar hack for any environment.)

You can avoid double end-of-proof symbols by using a similar hack. For example suppose you have:

```
\begin{proof}[Proof of \fullref{thm:main}]
...
Lot's of lines of proof.
...
The proof is completed by the following lemma:

\begin{lemma} Statement which finishes the proof.

\begin{proof}
...
\end{proof}   %%% of the lemma
\end{proof}   %%% of the main theorem
```

which gives an unsightly pair of end-of-proof symbols. Then type this instead:

```
\proof[Proof of \fullref{thm:main}]
...
Lot's of lines of proof.
...
The proof is completed by the following lemma:

\begin{lemma} Statement which finishes the proof.

\begin{proof}
...
\end{proof}   %%% of both
```

However it might be better in this case to change the wording (eg by adding a sentence "This completes the proof of the main theorem.") to avoid the conjunction of `\end{proof}`'s.

7.6 Fully linked cross-references

jloganal.cls provides a command `\fullref` (based on hyperref's `\autoref`) which makes the target for internal cross-references include the name. If you are reading this in a pdf viewer then you will notice that we have used this command in various places. For example here is a link to the top of this section: [Section 7](#), which was typed `\fullref{sec:fine}`. By contrast here is the same link typed `\ref{sec:fine}`: [Section 7](#).

This command works faultlessly for links to sections, subsections, figures and tables. However for theorems it needs some care. The name for the link is chosen by hyperref to correspond to the counter for the environment etc. So if, for example, theorems and lemmas share a counter, with the theorem counter set first, then `\fullref`'s will all use the name "Theorem", so should only be used for links to theorems. You can correct this with a hack as follows:

Set the theorem and lemma counters independently:

```
\newtheorem{thm}{Theorem}[section]
\newtheorem{lem}{Lemma}[section]
```

and then unite the counters with:

```
\makeatletter
\let\c@lem=\c@thm
\makeatother
```

Add and unite other counters as necessary. The name used by `\fullref` is set by a command of the form:

```
\makeautorefname{thm}{Theorem}
\makeautorefname{lem}{Lemma}
```

We have set most of the common ones (including these two) in the section near the start of jloganal.cls devoted to "hyperref stuff". If your links do not come out correctly look at this section and see if your environment name is listed. If not, add the appropriate command of this type to the header to your file. An example we have set that you might like to edit is this:

```
\makeautorefname{subsection}{Section}
```

which makes links to subsections come out thus: [Section 7.6](#). If you prefer such links to use for example "subsection" then add the line:

```
\makeautorefname{subsection}{subsection}
```

to the header to your file.

8 Control sequences

This section is “smallprint”. Refer to it if you run into problems with control sequences ie with `\(re)newcommand`. There are a large number of control sequences provided by basic \LaTeX and by the input files to `jloganal.cls` which will cause chaos if redefined. Examples are `\begin`, `\end`, `\cr`, `\long`, `\def`, `\span`, `\ref`, `\label`, `\tag`, `\cite`. We hope that you are experienced enough in the use of \LaTeX and the AMS packages to avoid the worst items in this minefield. Our purpose here is merely to point out the new commands used by `jloganal.cls` which will also cause chaos if redefined and perhaps more usefully, the ones that are provided just for your convenience and which may be redefined if you wish.

8.1 Commands which *must not* be redefined

`\stdskip` : the standard vertical skip
`\stdspace` : the standard horizontal space
`\nocolon` : which suppresses the caption colon in the `{figure}` environment (this is automated: typing `\caption{}` will suppress the colon)
`\sqr` : the square macro used to generate the end-of-proof symbol

The journal titles:

`\gt` : *Geometry & Topology*
`\gtm` : *Geometry & Topology Monographs*
`\agt` : *Algebraic & Geometric Topology*

All the metadata items: `\title`, `\author`, `\email`, etc (see [Section 2](#))

8.2 Commands which you may find useful but which may be redefined

`\ppar` : principal paragraph break (the same as `\par\medskip`)
`\qua` : abbreviation for `\stdspace`—three-quarters of a quad
`\sh{}` : for subheadings, which produces a subheading in the correct style without a number—roughly equivalent to `\subsection*{}`
`\rk{}` : for remarks, notes etc, which produces a subheading in the correct style without a number such that the text follows on directly—roughly equivalent to `\subsubsection*{}`
`\sq` : abbreviation for `\sqr55` (the end-of-proof symbol) also callable via `\qedsymbol` (the latter must not be redefined)
`\co` : abbreviation for `\colon\thinspace` which is a colon with correct spacing for maps
`\np` : abbreviation for `\newpage`
`\nl` : abbreviation for `\hfil\break` ie new line
`\cl` : abbreviation for `\centerline`
`\Q` : abbreviation for `\mathbb{Q}`, similarly `\R`, `\C` and `\Z`

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