

# Typesetting Guidelines for the journal *Theory of Computing*

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## Abstract

This document describes L<sup>A</sup>T<sub>E</sub>X typesetting guidelines for the journal *Theory of Computing*, including the use of the `toc.cls` class file.

## PRIMER

While detailed instructions for using the ToC<sub>T</sub>E<sub>X</sub> packages appear in the complete guide below, in most cases you may typeset your article by adapting the template file `toc-template.tex` and adhering to the following basic guidelines.

1. Please submit your manuscript in a single `.tex` file and a single `.bib` file, a file called `packages.sty` (listing the packages used), a file called `aumacros.sty` (listing the authors' custom macros), the figure files, and any additional files needed to compile the article. (Hopefully no additional files will be needed.) Copyediting becomes extremely cumbersome when the text of the article is divided up into multiple `.tex` files.
2. Minimize usage of L<sup>A</sup>T<sub>E</sub>X packages and custom L<sup>A</sup>T<sub>E</sub>X macros. Please delete all macros and packages not used in the paper.
3. *Never* use `\def` to define commands; instead use the robust command `\newcommand`. Avoid using macro names that are prefixes of standard L<sup>A</sup>T<sub>E</sub>X macros; a rule of thumb is that your macro names should either consist of *at least three characters* of at least two characters, one of which is a Capital letter. *Do not use* `\renewcommand` as it will, by design, change the meaning of predefined macros and may cause typesetting errors that will go undetected.
4. Please remove all text from the source file that does not contribute to the PDF output. This includes text made invisible by various constructs such as `\iffalse ... \fi` or `\ignore{...}`. The reason for this request is twofold: these invisible passages considerably increase the copy editors' job; and they remain visible in the final published source file. They can also be a source of big potential mistakes.

*Exception:* Do not remove the text of our template, but please remove your own text commented out by the percentage (%) signs to help the copyeditor.

*Note:* All commented-out text will automatically be removed before publication.

5. If a preliminary version of your article has been published, add a footnote to the title with a reference to the preliminary version. If possible, link to the preliminary version, preferably with a DOI. For example:

```
\title{Article title}\titlefootnote{A
  \href{https://doi.org/10.1145/1806689.1806743}{preliminary
  version} of this paper appeared in the Proc. of the 42nd ACM
  Symp.\ on Theory of Computing (STOC'10).}}
```

Note that links to DOIs have the form `https://doi.org/(doi)`. Thus

<https://doi.org/10.1145/1806689.1806743>

is the proper link to the DOI 10.1145/1806689.1806743.

6. Your abstract should be self-contained. Please do not use macros other than standard LaTeX macros in the Abstract. Please refer to citations by author name rather than number. For example, rather than

This paper continues the work of [8] and builds upon the techniques of [17] and [18].

we prefer

This paper continues the authors' work (ICALP'05) and builds upon the techniques of Taylor et al. (2005) and Taylor and Zhang (STOC'04).

Here "Taylor et al." refers to a journal article with three or more authors.

7. We prefer to place tiny spaces between the letters in abbreviations like Ph. D., M. S., e. g., i. e., etc. This can be accomplished in LaTeX using `\,`, which produces a small space; thus,

Ph.\,D.      M.\,S.      B.\,S.      e.\,g.      ...

We supply the macros `\phd`, `\msc`, `\bsc`, `\eg`, and `\ie`, which will produce these abbreviations with correct spacing. Note that in standard usage, the abbreviations "e. g." and "i. e." are always followed by a comma.

8. Please use `\emph` rather than `\em` to *emphasize* text, as `\emph` is smart about space following the emphasized text: the emphasized text "*sonticus*" is produced by the LaTeX snippet `\emph{sonticus}`. Similarly, use the LaTeX2e commands `\texttt`, `\textsl`, `\textit`, `\textsf`, and `\textbf`, to produce teletype, slanted, italic, sans-serif, and bold text. These commands take the text on which they operate as arguments: thus `\textsf{sans-serif}` produces sans-serif. In math mode, please use the `\text` command to produce fragments of regular text. For example,

```
\[
C_U = \{ f \mid \text{$f$ is uniformly continuous on $U$}\}
\]
```

produces the typesetting

$$C_U = \{f \mid f \text{ is uniformly continuous on } U\}$$

Use `\N`, `\Z`, `\Q`, `\R`, and `\C` to produce the symbols for the five common number systems; they will be typeset in blackboard-bold as  $\mathbb{N}$ ,  $\mathbb{Z}$ ,  $\mathbb{Q}$ ,  $\mathbb{R}$ ,  $\mathbb{C}$ . Use the `\mathbb` command to create other blackboard-bold characters in math mode; for instance `\mathbb{H}` will produce  $\mathbb{H}$ , the standard symbol for the quaternions.

9. You are probably familiar with LaTeX's mechanism for labels and references (via the `\label` and `\ref` commands). In ToC articles, we use an amplification of this system offered by the `\expref` command. The advantage is that this command provides a larger hyperlink anchor: for example, the standard reference `Theorem~\ref{thm:Markov}` produces the typesetting Theorem 1; note that the number is the anchor. In contrast, the command `\expref{Theorem}{thm:Markov}` produces the typesetting [Theorem 1](#). Please use `\expref` where you would usually use `\ref` with the exception of equations, which are referred to with the `\expeqref` command: e. g., `\expeqref{Equation}{eq:covariance}` which produces the typesetting: [Equation \(2\)](#).
10. Macros for theorem-like environments (theorems, definitions, etc.) and proofs are provided by `toc.cls` (using the `amsthm` package). Theorems, propositions, definitions, etc., are typeset via the familiar environments:

```
\begin{theorem}[Stokes' Theorem]
  Theorem body.
\end{theorem}
```

Proofs are typeset similarly:

```
\begin{proof}
  Proof body.
\end{proof}
```

In cases where a proof *ends* with a displayed equation, use the `\qedhere` command to place the end of proof marker on the same line as the displayed equation. For example,

```
\begin{proof}
  ...
  And we conclude that
  \[
  X = \iint_{\delta S} f, . \qedhere
  \]
\end{proof}
```

will produce

*Proof.* ...

We conclude that

$$X = \iint_{\delta S} f. \quad \square$$

(Without the `\qedhere` command, the  $\square$  symbol would appear on the subsequent line.) Avoid proofs outside the *proof* environment. If you find it necessary to present a proof without a *proof* environment, use the `\hfill\qed` command to manually lay out an “end of proof” marker  $\square$ .

In the case where a proof is not adjacent with the theorem it supports, indicate this with the optional argument as below:

```
\begin{proof}[Proof of \expref{Theorem}{thm:Markov}.]
  To prove \expeqref{inequality}{markov.eq}, expand the definition of
  $E[X]$.
\end{proof}
```

This produces the typeset output:

*Proof of [Theorem 1](#).* To prove [inequality \(1\)](#), expand the definition of  $E[X]$ .  $\square$

See [Section 4](#) for further details.

11. ToC numbers theorems, lemmas, definitions, remarks, etc. consecutively within each section. So Section 3 might begin with Definition 3.1, followed by Theorem 3.2, Remark 3.3, Lemma 3.4, Theorem 3.5, etc. *Please do not defeat this numbering scheme.* Consecutive numbering makes it easier to find and reference and item. Do not deviate from this even for the main results (like “Theorem A”), you can say instead `\begin{theorem}[Main Theorem-A]`

12. Make sure you use the math operators provided by LaTeX, e.g., `\log`, `\ln`, `\exp`, `\dim`, `\min`, `\max`, `\gcd`. These will result in appropriate type and spacing. If you need to define your own operator, use the `\DeclareMathOperator` command in the preamble (before `\begin{document}`). For example,

```
\DeclareMathOperator{\Schur}{\mathbb{S}}
\DeclareMathOperator{\Specht}{\mathrm{Specht}}
\begin{document}
...
Schur--Weyl duality yields  $V^{\otimes n} = \bigoplus_{\lambda} (\mathrm{Schur}^{\lambda}(V))^{\otimes \mathrm{Specht}_{\lambda}}$ .
```

will print “Schur–Weyl duality yields  $V^{\otimes n} = \bigoplus_{\lambda} (\mathbb{S}^{\lambda}(V)) \otimes \text{Specht}_{\lambda}$ .”

13. Please use the ToC macro `\eee` to typeset the base of the natural logarithm. This will print `\mathrm{“e”` to distinguish it from variables that might be called  $e$ .
14. Graphics must be supplied in .pdf (acrobat) and included with the `\includegraphics` command. We encourage use of pgf/TikZ for creation of in-line graphics. We use the `subcaption` package to layout subfigures. See [Section 3](#) for a more complete description.
15. Supply your cited references as a BibTeX database.
16. ToC publishes reasonably full names of bibliography authors. Please supply them.
17. It will be most helpful if you can provide *include digital object identifiers* for each BibTeX record. This amounts to adding, for each BibTeX record, a line of the form

`doi = {xxx},`

See [Section 6](#) for further details.

18. ToC discourages appendices. We ask you to fold their material into the body of the article. If you feel some material must remain in appendices, please place those appendices before the acknowledgments and the bibliography.
19. ToC posts authors’ photos on the “About the authors” web page associated with the article. If you agree to have your picture posted, please email it to the editors in jpeg format, along with the final, ToC-typeset manuscript. Ideally the picture should be 150 pixels wide; if it is different, the software will adjust its width to 150 pixels. The height to width ratio of the picture should be between  $2^{1/\pi}$  and the golden ratio: an ideal photograph will be  $150 \times 243$  pixels.
20. Please include a brief biographic sketch of each author at the end of the article, in the “about the authors” section. Take the biographical sketches of previously published papers as models. Some guidelines: please include basic information about your education, research, career (institutions, advisor(s), thesis title, honors/awards, list of areas of interest in some detail [“complexity theory” will not distinguish you from the majority of authors]). This is a good place to pay tribute to a mentor who helped shape your career—perhaps someone at your high school. We encourage you to include some personal information (place where you grew up, family, hobby, etc.), sprinkle it with humor. Please include links in the biographical sketch (to your advisor’s and your Alma Mater’s home page, your favorite hobby site, etc.).
21. Compile your article with `pdflatex`.

# COMPLETE TYPESETTING GUIDE

This document describes typesetting guidelines for the *Theory of Computing*. Articles for *Theory of Computing* are to be typeset using pdfL<sup>A</sup>T<sub>E</sub>X, using the ToC<sub>T</sub>E<sub>X</sub> class files. The most recent version of the class files (and this explanatory document) may be found at

<http://www.theoryofcomputing.org/submit/toclatexguide.html>.

**The author kit** In order to prepare your article for *Theory of Computing*, you will need the files

toc.cls	The top-level style file.
tocbase.cls	A subordinate style file, required by toc.cls.
tocplain.bst	The ToC bibliography style file.
toc-instructions.pdf	These instructions.
toc-instructions.tex	The L <sup>A</sup> T <sub>E</sub> X file that produced these instructions.
toc-instructions.bib	A accompanying example Bib <sub>T</sub> E <sub>X</sub> file.
toc-template.tex	A template file for ToC articles.

## 1 Preamble, title, and author data

Your file should begin with

```
\documentclass{toc}
```

The preamble (this is the portion of the L<sup>A</sup>T<sub>E</sub>X file appearing between `\documentclass{...}` and the `\begin{document}`) should invoke the `\tocdetails` command in order to set metadata associated with the article:

```
\tocdetails{
  title = {Full title},
  plaintexttitle = {Math-redacted title for pdf metadata}, (optional)
  runningtitle = {Shortened title for page headers}, (optional)
  author = {Author list: Full Name, Full Name, and Full Name},
  plaintextauthor = {Author list, no LATEX, no “and”: Full Name, Full Name, Full Name},
  copyrightauthor = {Shortened author list for copyright banner}, (optional)
  runningauthor = {Shortened author list for page headers}, (optional)
  acmclassification = {List of ACM classifications},
  amsclassification = {List of AMS classifications},
  keywords = {List of keywords, lowercase}
}
```

Comments on setting the article’s metadata:

**Title declarations** Use the `title` key to declare the full title of the article, which may include L<sup>A</sup>T<sub>E</sub>X typesetting commands. If your title is long or contains L<sup>A</sup>T<sub>E</sub>X formatting like mathematical symbols, there are two other keys that will require attention: If your title contains L<sup>A</sup>T<sub>E</sub>X formatting, set the key `plaintexttitle` to a simple ascii version of the title—this will be used to set the pdf metadata for the article, in which special L<sup>A</sup>T<sub>E</sub>X commands will not be interpreted. If your title is long, set the key `runningtitle` to a shortened version of the title that can fit in the header of a journal page. If neither of these circumstances apply (that is, your title is reasonable short and has no L<sup>A</sup>T<sub>E</sub>X commands), then it suffices to simply set the `title` key—the others will be set automatically to the same value.

**Author declarations.** Use the `author` key to declare the complete list of authors, using full author names and correct punctuation. For example,

```
author = {Alex Russell and K\'alm\'an Sz\H{o}l\H{o}ssy},
```

If you have three or more authors, use the format

```
author = {Full Name, Full Name, and Full Name},
```

You must use the `plaintextauthor` key to separately declare the author listing that will be included with the article's pdf metadata. This is for two reasons: this must be a strictly comma delimited list (so no “and” before the last author), and no  $\LaTeX$  typesetting is permitted. Thus:

```
plaintextauthor = {Alexander Russell, Kalman Szolossy},
```

If your author list is long, there are two other keys that might need attention: `runningauthor` and `copyrightauthor`. These will default to the same value as `author` which is fine unless your author list overflows the page headers or the copyright box. In either of these cases, set the keys here to a shortened list of authors. You may shorten the author list by abbreviating first names (e.g., “K. \ Sz\H{o}l\H{o}ssy”) or, in extreme cases, “et al.”

**Keywords and classification data** Select a short list of appropriate keywords for your article: these should appear in a comma-delimited list as a parameter to the `keywords` key; keywords are not terminated with a period. Similarly, use the `acmclassification` and `amsclassification` keys to declare lists of ACM and AMS classifications from the lists at

<http://www.acm.org/about/class/ccs98-html> and <http://www.ams.org/msc/>.

(Note that typical computer science classifications in the AMS taxonomy appear in category 68-xx.) Your classification choices should appear as comma-delimited lists; again, do not terminate these lists with a period.

**The title page.** The title page layout, including the title, individual authors, and the abstract, is defined by the `frontmatter` environment. This should appear right after `\begin{document}`.

```
...
\begin{document}

\begin{frontmatter}
\title{Typesetting Guidelines for the\ \ \textsl{Theory of Computing}}

\author[alex]{Alexander Russell}

\author[kalman]{K\'{a}lm\'{a}n Sz\H{o}l\H{o}ssy\thanks{A fictitious
name.}}

\begin{abstract}
  This document describes \LaTeX\ typesetting guidelines for the
  \emph{Theory of Computing}, including the use of the
  \texttt{toc.cls} class file.
\end{abstract}

\end{frontmatter}
...
```

**Title and author data** Use the `\title{...}` command to typeset your full title. This is not always necessary, as the style file will pick up your title from the `tocdetails` command above. However, if you wish to have fine control over the position of carriage returns in the title (via placement of `\ \` markers) or wish to have a footnote on the title (which is generated with the `\titlefootnote{...}` command), you must (re-)declare the title here.

One `\author` command must appear for each author. Footnotes on author names may be obtained by the `\thanks` command, as above. You may use such footnotes to acknowledge financial support. Avoid lengthy footnotes using `\thanks`: In particular, the `tocauthors` and `tocaboutauthors` environments, described below, are to be used to record author contact data. The optional arguments (e. g., `alex` and `kalman` above) are used to associate the authors' names with this contact data. After the bibliography, further author data is provided:

```
...
\begin{document}
\begin{frontmatter}
...
\end{frontmatter}
% Article body here.
...
\bibliographystyle{tocplain}
\bibliography{toc-example}

\begin{tocauthors}
\begin{tocinfo}[alex]
  Alexander Russell\\
  Professor\\
  University of Connecticut, Storrs, CT\\
  acr\to cat{}cse\to cdot{}uconn\to cdot{}edu\\
  \url{http://www.engr.uconn.edu/~acr}
\end{tocinfo}
\begin{tocinfo}[kalman]
  K\'{a}lman Sz\'{o}ll\'{o}ssy\\
  Senior fictitious author\\
  TOC Hungary Inc., Kecskem\'{e}t, Hungary\\
  kszolos\to cat{}ailab\to cdot{}toc\to cdot{}hu \\
  \url{http://www.toc.hu/~kalman}
\end{tocinfo}
\end{tocauthors}

\begin{tocaboutauthors}
\begin{tocabout}[alex]
\textsc{Alex Russell} graduated from \href{http://www.mit.edu}{M.I.T.}
in 1996; his advisor was \href{http://www-math.mit.edu/~sipser/}{Mike
Sipser}. He enjoys editing the \href{http://theoryofcomputing.org}%
{\textsf{Theory of Computing}} and struggling with mathematics.
\end{tocabout}
\begin{tocabout}
\textsc{K\'{a}lman Sz\'{o}ll\'{o}ssy} is a fictitious author whose name,
with its copious accents, emphasizes proper use of the plaintextauthor
key.
\end{tocabout}
\end{tocaboutauthors}

\end{document}
```

## 2 General typesetting requests

Use the `\section` command to break your exposition into natural sections. For example,

```
\section{General typesetting requests}
```

was the command used to typeset the beginning of this section. In *Theory of Computing*, section headings are given regular sentence capitalization, and are not terminated with periods.

Please use `\emph` rather than `\em` to *emphasize* text, as `\emph` is smart about space following the emphasized text: the emphasized text “*sonticus*” is produced with the L<sup>A</sup>T<sub>E</sub>X fragment `\emph{sonticus}`. Similarly, use the L<sup>A</sup>T<sub>E</sub>X2<sub>ε</sub> commands `\texttt`, `\textsl`, `\textit`, `\textsf`, and `\textbf`, to produce teletype, *slanted*, *italic*, sans-serif, and **bold** text. In math mode, please use the math mode commands `\mathrm` and `\mathbf` commands to produce Roman and **boldface** characters. *CALLIGRAPHIC* characters are produced by the `\mathcal` command (in math mode only). Use `\mathbb{N}`, `\mathbb{Z}`, `\mathbb{Q}`, `\mathbb{R}`, and `\mathbb{C}` to produce the symbols for the five common number systems; they will be typeset in blackboard-bold as  $\mathbb{N}$ ,  $\mathbb{Z}$ ,  $\mathbb{Q}$ ,  $\mathbb{R}$ ,  $\mathbb{C}$ . Use the `\mathbb{H}` command to create other blackboard-bold characters in math mode; for instance `\mathbb{H}` will produce  $\mathbb{H}$ , the standard symbol for the quaternions.

## 3 Figures and included images

If you wish to include images in your article, please use the `\includegraphics` command in the `graphicx` package. Add

```
\usepackage{graphicx}
```

in the preamble, after the `\documentclass{toc}` command. Included images should always appear within a figure environment:

```
\begin{figure}[ht]
  \centering
  \includegraphics[width=5cm]{petersen}
  \caption{Petersen's graph: an included image.}
  \label{fig:Petersen}
\end{figure}
```

This produces [Figure 1](#).

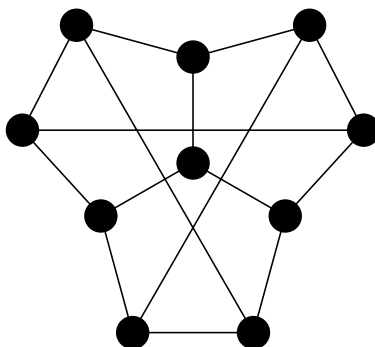


Figure 1: Petersen's graph: an included image.

As *Theory of Computing* publishes articles using Adobe's acrobat (.pdf) format, we ask that you provide versions of your included figures in this format. Figures in encapsulated postscript format can be used to generate acrobat figures by the `epstopdf` program, also available in the comprehensive T<sub>E</sub>X archive network at

<http://www.ctan.org/tex-archive/support/epstopdf/>.



**Remark.** The `\includegraphics` command adapts its behavior depending on whether your  $\text{\LaTeX}$  file is compiled with `latex` or `pdflatex`; so long as you do not have an extension on the filename in the `\includegraphics` command (as above), it will attempt to load the file with a `.pdf` extension when called from `pdflatex` and a `.eps` extension when called from `latex`.

**PGF and TikZ** PGF is an extremely powerful and flexible engine for generating high-quality pdf graphics in a  $\text{\LaTeX}$  document. PGF graphics are produced natively by the `pdf $\text{\LaTeX}$`  engine, so they provide a few advantages over inclusion of externally-produced pdf graphics: the source code for the graphics appears as a part of the article (rather than a separate graphics file) and text in the graphics automatically inherits font information from the  $\text{\LaTeX}$  document. For example, Figure 2 was produced by the `pgf` package.

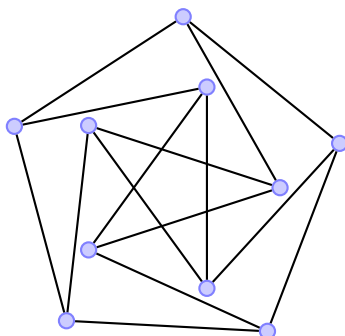


Figure 2: Petersen's graph in  $\mathbb{R}^2$  as a unit-distance graph.

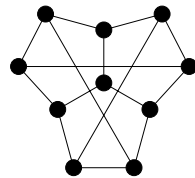
**Subfigures** Subfigures (that is, figures including several “subfigures,” as in Figure 3) can be produced with the `subcaption` package; this replaces the deprecated `subfigure` and `subfig` packages. To use this infrastructure, add

```
\usepackage{caption,subcaption}
```

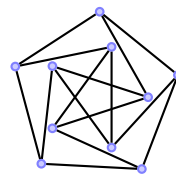
to the preamble of your document. Figures with subfigures are produced as in the following example:

```
\begin{figure}[ht]
  \begin{subfigure}[b]{.45\textwidth}
    \centering
    \includegraphics[width=2.5cm]{petersen} % An included image.
    \caption{Petersen's graph.}
    \label{subfig:Petersen}
  \end{subfigure}
  \quad
  \begin{subfigure}[b]{.45\textwidth}
    \centering
    (tikz picture code removed)
    \caption{Petersen's graph in  $\mathbb{R}^2$  as a
      \href{http://en.wikipedia.org/wiki/Unit_distance_graph}{unit-distance graph}.}
    \label{subfig:pgf-petersen}
  \end{subfigure}
  \caption{Two subfigures with captions.}
  \label{fig:sub-example}
\end{figure}
```

With labels properly included in the subfigures, references to them are automatically handled correctly: the  $\LaTeX$  fragment `\expref{Figure}{subfig:Petersen}` produces the reference [Figure 3a](#).



(a) Petersen's graph.



(b) Petersen's graph in  $\mathbb{R}^2$  as a unit-distance graph.

Figure 3: Two subfigures with captions.

## 4 Mathematical formulæ and proofs

The AMS theorem class is loaded by default, along with standard macros for many theorem-like environments. Theorems, definitions, etc. are coded as follows:

```
\begin{theorem}[Markov's inequality]
\label{thm:Markov}
  Let  $X$  be a positive real-valued random variable. Then, for
  every positive  $\alpha$ ,
\begin{equation} \label{markov.eq}
  \Pr [ X \geq \alpha ] \leq \frac{E[X]}{\alpha}, .
\end{equation}
\end{theorem}
```

The code above produces the following typesetting:

**Theorem 1** (Markov's inequality). *Let  $X$  be a positive real-valued random variable. Then, for every positive  $\alpha$ ,*

$$\Pr[X \geq \alpha] \leq \frac{E[X]}{\alpha}. \quad (1)$$

Constructs for propositions, corollaries, claims, and lemmas are predefined, invoked as above, and share numbering with theorems. For example:

```
\begin{proposition}[Chebyshev's inequality]\label{prop:Chebyshev}
  Let  $X$  be a real-valued random variable. Then, for every positive
   $\lambda$ ,
  \[
  \Pr \bigl[ |X - E[X]| \geq \lambda \bigr] \leq
  \frac{\sigma^2[X]}{\lambda^2}, .
  \]
\end{proposition}
```

produces the following typesetting:

**Proposition 2** (Chebyshev's inequality). *Let  $X$  be a real-valued random variable. Then, for every positive  $\lambda$ ,*

$$\Pr[|X - E[X]| \geq \lambda] \leq \frac{\sigma^2[X]}{\lambda^2}.$$

Similar environments for definitions, conjectures, examples, remarks, and facts are also defined. They are typeset slightly differently but do share numbering with the constructs above. For example

**Definition 3.** Let  $X$  be a real-valued random variable for which  $E[X^2] < \infty$ . The standard deviation of  $X$ , denoted  $\sigma[X]$ , is given by

$$\sigma[X] = \sqrt{E[(X - E[X])^2]}.$$

If you wish to define a new theorem-like environment (`idea`, for example), you must inform  $\text{\LaTeX}$  about the environment in the preamble of your document (that is, between the `\documentclass{toc}` command and the `\begin{document}` command). If you wish to define the environment so that it is typeset like a Theorem (text in italics), use the sequence of commands:

```
\theoremstyle{plain}
\newtheorem{idea}[theorem]{Idea}
```

If you wish to define an environment so that it is typeset like a Definition (text in Roman), use the sequence of commands:

```
\theoremstyle{definition}
\newtheorem{thought}[theorem]{Thought}
```

Proceed to use the construct in the body of your article as follows:

```
\begin{idea}
  Use binary-coded-decimal instead of the long code.
\end{idea}
```

This will produce the output:

**Idea 4.** *Use binary-coded-decimal instead of the long code.*

With the `thought` environment, the code will be this:

```
\begin{thought}
  Use binary-coded-decimal instead of the long code.
\end{thought}
```

This will produce the output:

**Thought 5.** Use binary-coded-decimal instead of the long code.

Proofs use the `\proof` environment: the code

```
\begin{proof}
  Expand the definition of  $E[X]$ .
\end{proof}
```

produces:

*Proof.* Expand the definition of  $E[X]$ . □

In the case where a proof is not adjacent with the theorem it supports, indicate this with the optional argument as below:

```
\begin{proof}[Proof of \expref{Theorem}{thm:Markov}.]
  To prove inequality~\eqref{markov.eq}, expand the definition of
 $E[X]$ .
\end{proof}
```

produces

*Proof of Theorem 1.* To prove inequality (1), expand the definition of  $E[X]$ . □

(We'll discuss the `\expref` referencing command shortly.)

**Equations.** Unnumbered equations, like the one appearing in [Proposition 2](#) above, are produced by the `$$` (or `\[` and `\]`) delimiters: for example,

```
$$
\sigma^2[X] = E\Bigl[\bigl(X - E[X]\bigr)\Bigr], .
$$
```

produces the equation

$$\sigma^2[X] = E\left[(X - E[X])^2\right].$$

Please use `\,`, as above, to provide space between equations and any following punctuation. Note how the size of delimiters such as `|` and `[` can be changed in an equation by use of the modifiers `\bigl` and `\Bigl`. To have  $\LaTeX$  automatically adjust the size of such delimiters, use `\left` and `\right`, as in [\(2\)](#) below.

Numbered equations are produced using the standard equation environment. For example, the  $\LaTeX$  code

```
\begin{equation}
\label{eq:covariance}
\cov[X,Y] = E\left[\bigl(X - E[X]\bigr)
\bigl(Y - E[Y]\bigr)\right], .
\end{equation}
```

produces the equation

$$\text{Cov}[X,Y] = E\left[(X - E[X])(Y - E[Y])\right]. \quad (2)$$

To refer to an equation from the main text body, use the `\eqref` command with the label attached to the equation by the `\label` command. For example, the reference equation [\(2\)](#) is produced by the  $\LaTeX$  code `equation~\eqref{eq:covariance}`. (The `~` produces a hard space— $\LaTeX$  will not allow it to break a line.)

## 5 Labels and references

Labels are attached to sections, theorems, equations and the like by invoking the command `\label{labelname}` and usually referred to by using `\ref{labelname}`. (See examples above.) Though not required by  $\LaTeX$  we suggest that label names follow a prefix convention that can be used to identify the type of label. For example, labels attached to Theorems might be prefixed by `thm:`. This makes copy editing the  $\LaTeX$  file easier.

Links will automatically be generated between references like Theorem [1](#) and the object to which they refer. We provide an easy method to enlarge the size of the hyperreference anchor, using the `\expref` command. Specifically, the command `\expref{Theorem}{thm:Markov}` produces the satisfactory output [Theorem 1](#). Please use `\expref` wherever you would use `\ref`, with the exception of equations, which are referred to with the `\eqref` command: e.g., `equation~\eqref{eq:covariance}`.

## 6 Bibliography; digital object identifiers

The references you cite must be specified by a Bib $\TeX$  database. As always with Bib $\TeX$ , care must be taken to guarantee the correct appearance of author names (especially if they contain accents) and formulae appearing in titles. Consider the following two Bib $\TeX$  entries, noting that portions of the Bib $\TeX$  fields that must be processed verbatim by  $\LaTeX$  (e.g., for appearance of accents, math, and capitalization) are enclosed in braces:

```
@article{v001a005,
author = {Peter {H{o}yer} and Robert {\v{S}}palek},
title = {Quantum Fan-out is Powerful},
journal = {Theory of Computing},
year = {2005},
pages = {81--103},
```

```

doi = {10.4086/toc.2005.v001a005},
volume = {1},
}

@article{v002a011,
author = {Moses Charikar and Robert Krauthgamer},
title = {Embedding the {Ulam} metric into  $\ell_2$ },
journal = {Theory of Computing},
year = {2006},
pages = {207--224},
doi = {10.4086/toc.2006.v002a011},
volume = {2},
}

```

We will typeset your article with the Bib $\text{\TeX}$  style file `tocplain.bst`, provided in the author kit. Please use this as you prepare your article for ToC; your bibliography (which appears before the *about the authors* section) will be generated by the sequence of commands:

```

...
\bibliographystyle{tocplain}
\bibliography{toc-example}
...

```

**Digital object identifiers** Please provide a *digital object identifier* (DOI) for those of your references that possess them. These can be embedded directly in your Bib $\text{\TeX}$  database using the `doi={ }` field, as above. For example, the article “Embedding the Ulam metric into  $\ell_1$ ” by Charikar and Krauthgamer [2], which appeared in volume 2 of *Theory of Computing*, has been assigned the DOI:10.4086/toc.2006.v002a011. In general, the DOI associated with an article can be found on the publisher’s page for the article. For example, the DOI for the article “Linearity testing in characteristic two,” by Bellare et al. [1], can be found on the article’s homepage on IEEE website for the IEEE Transactions on Information Theory. The DBLP can be a fast way to find such article homepages.

## References

- [1] Mihir Bellare, Don Coppersmith, Johan Håstad, Marcos Kiwi, and Madhu Sudan. Linearity testing in characteristic two. *IEEE Trans. Inform. Theory*, 42(6):1781–1795, 1996. doi:10.1109/SFCS.1995.492574.
- [2] Moses Charikar and Robert Krauthgamer. Embedding the Ulam metric into  $\ell_2$ . *Theory of Computing*, 2:207–224, 2006. doi:10.4086/toc.2006.v002a011.
- [3] Peter Høyer and Robert Špalek. Quantum fan-out is powerful. *Theory of Computing*, 1:81–103, 2005. doi:10.4086/toc.2005.v001a005.