GUIDE TO USING SIAM'S LaTeX STYLE*

DIANNE DOE†, PAUL T. FRANK‡, AND JANE E. SMITH‡

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Abstract. Documentation is given for use of the SIAM LaTeX macros. Instructions and suggestions for compliance with SIAM style standards are also included. Familiarity with standard LaTeX commands is assumed.

Key words. LaTeX, BibTeX, SIAM Journals

AMS subject classifications.

1. Introduction.

This file is documentation for the SIAM LaTeX style, including how to typeset the main document, the BibTeX file, and any supplementary material. More information about SIAM's editorial style can be found in the style manual, available at `http://www.siam.org/journals/pdf/stylemanual.pdf`. The SIAM latex files can be found at `http://www.siam.org/journals/auth-info.php`. The files are that are distributed are given below. **To do:** Fix file names.

- `siamart.cls` (required): Main LaTeX class file.
- `siamplain.bst` (required): Bibliographic style file for BibTeX.
- `docsiamart.tex`: Produces this documentation.
- `docsiambib.bib`: Example BibTeX database.
- `docsiamsupp.tex`: Supplemental file example and documentation.

The outline of a SIAM LaTeX article is shown in Example 1.

Example 1: Document outline

```
\documentclass{siamart}

% Packages and macros definitions go here.

\begin{document}

% Front matter goes here: title, authors, abstract, etc.
% Main body goes here.
% Appendices goes here (optional).
% Acknowledgements go here (optional).
% Bibliography goes here.

\end{document}
```

Class options can be included in the bracketed argument of the command, separated by commas. By default, lines which extend past the margin will have black boxes next to them to help authors identify lines that they need to fix, by rewriting or inserting breaks. Enabling the `final` option turns these boxes off, so that very small margin breaks which are not noticible will not cause boxes to be generated. Use the `review` option to create line numbers before submitting your manuscript to a SIAM

*Acknowledgments such as funding go here.

†Imagination Corp., Chicago, IL (ddoe@imag.com).

‡Department of Applied Mathematics, Fictional University, Boise, ID (ptfrank@fictional.edu, jesmith@fictional.edu).

journal.

2. Front matter. **To do:** We should change this to set pdftitle and pdfauthor, and then also use these in setting the page headers with markboth. The title and author parts are formatted using the standard `\title`, `\author`, and `\maketitle` commands as described in Lamport [4]. If there is more than one author, the authors should be separated by the `\and` command. The addresses and support acknowledgments are added via `\thanks`. Each author's thanks should specify their address. The support acknowledgment should be put in a thanks for the title, unless specific support needs to be specified for individual authors, in which case it should follow the author address. The header for this file was produced by the code in Example 2, including an example of a shared footnote.

Example 2: Title and authors

```
\title{Guide to Using SIAM's \LaTeX\ Style%
  \thanks{Acknowledgments such as funding go here.}}

\subtitle{\today}

\author{Dianne Doe%
  \thanks{Imagination Corp., Chicago, IL (\email{ddoe@imag.com}).}%
  \and
  Paul T. Frank%
  \thanks{Department of Applied Mathematics, Fictional University, Boise,
    ID
    (\email{ptfrank@fictional.edu}, \email{jesmith@fictional.edu}).}
  \and
  Jane E. Smith%
  \footnotemark[3]
}

\maketitle
```

Example 3 shows how to specify the page headings, with the authors' names and the title (possibly shortened to fit).

Example 3: Page headers

```
\pagestyle{myheadings}
\thispagestyle{plain}
\markboth{\MakeUppercase{Dianne Doe, Paul T. Frank, and Jane E. Smith}}%
{\MakeUppercase{\siampretitle\@ Guide to Using  SIAM'S \LaTeX\ Style}}
```

Following the author and title is the abstract, key words listing, and AMS subject classifications, designated using the `abstract`, `keywords`, and `AMS` environments. Authors are responsible for providing AMS numbers which can be found on the AMS web site [1]. The abstract, keywords, and AMS subject classifications for this document were specified in Example 4.

Example 4: Abstract, keywords, and AMS classifications

```
\newcommand{\BibTeX}{{\scshape Bib}\TeX\xspace} % <- Preamble
\begin{abstract}
  Documentation is given for use of the SIAM \LaTeX\ macros.
  Instructions and suggestions for compliance with SIAM style
  standards are also included. Familiarity with standard \LaTeX\
  commands is assumed.
\end{abstract}

\begin{keywords}
  \LaTeX, \BibTeX, SIAM Journals
\end{keywords}

\begin{AMS}
\end{AMS}
```

3. Cross-references and hyperlinks. SIAM now supports cross-references and hyperlinks via the `cleveref` and `hyperef` packages. To create a cross reference, use the commands `\cref` (inside sentence) and `\Cref` (beginning of a sentence) in place of the object name and `\ref`; examples are shown in the sections below for equations, tables, figures, sections, etc.. Hyperlinks are created with the `\href` and `\url` commands, as shown in Example 5. SIAM has also defined the `\email` command, as shown in Example 2.

Example 5: Creating hyperlinks

```
Click \href{http://www.siam.org}{here} to go to the SIAM homepage;
the url is \url{http://www.siam.org}.
```

Click here to go to the SIAM homepage; the url is http://www.siam.org.

4. Math and equations. Here we show some example equations, with numbering, and examples of referencing the equations. SIAM now includes the package `amsmath` by default. The SIAM LaTeX class adds the following macros by default: `\const`, `\diag`, `\grad`, `\Range`, `\rank`, `\supp`. This have the effect of rendering the item as a `mathop`. Examples 6 to 13 use many of the features of the package `amsmath` and examples from [5].

Example 6: Blackboard math

```
\usepackage{amsfonts} % <- Preamble
Blackboard bold characters, such as $\mathbb{C}$ and $\mathbb{R}$,
should be created with the \texttt{amsfonts} package, although this
is not included by default.
```

Blackboard bold characters, such as $\mathbb{C}$ and $\mathbb{R}$, should be created with the `amsfonts` package, although this is not included by default.

Example 7: In-line math

```
The following shows normal setup of math in text:
Let $S=[s_{ij}]$ ($1\leq i,j\leq n$) be a $(0,1,-1)$-matrix of order $n$.
```

The following shows normal setup of math in text: Let $S = [s_{ij}]$ $(1 \leq i, j \leq n)$ be a $(0, 1, -1)$-matrix of order n.

Example 8: In-line matrix

```
Matrices of no more than two rows appearing in text can be created
as shown in the next example:
$B = \bigl[ \begin{smallmatrix} B_{11} & B_{12} \\
  B_{21} & B_{22} \end{smallmatrix} \bigr]$.
```

Matrices of no more than two rows appearing in text can be created as shown in the next example: $B = \left[\begin{smallmatrix} B_{11} & B_{12} \\ B_{21} & B_{22} \end{smallmatrix}\right]$.

Example 9: Creating matrices

```
Display matrices can be rendered using environments from \texttt{amsmath}:
\begin{equation}\label{eq:matrices}
  S=\begin{bmatrix}1&0\\0&0\end{bmatrix}
  \quad\text{and}\quad
  C=\begin{pmatrix}1&1&0\\1&1&0\\0&0&0\end{pmatrix}.
\end{equation}
Equation \cref{eq:matrices} shows some example matrices.
```

Display matrices can be rendered using environments from `amsmath`:

$$S = \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix} \quad \text{and} \quad C = \begin{pmatrix} 1 & 1 & 0 \\ 1 & 1 & 0 \\ 0 & 0 & 0 \end{pmatrix}. \tag{1}$$

Equation (1) shows some example matrices.

Example 10: Using SIAM-defined macros

```
\usepackage{braket,amsfonts} % <- Preamble
An example of a SIAM macro:
\begin{equation}\label{eq:range}
  \Range(A) = \set{ y \in \mathbb{R}^n | y = Ax }
\end{equation}
```

An example of a SIAM macro:

$$\mathrm{Range}(A) = \{\, y \in \mathbb{R}^n \mid y = Ax \,\} \tag{2}$$

Example 11: Equation split across lines

```
We claim that the projection $g(U,V)$ is given by the pair of matrices:
\begin{multline} \label{eq:ml}
  g(U,V) = \biggl( \frac{R(U,V)V\Sigma^{T}U^{T} -
      U\Sigma V^{T}R(U,V)^{T}}{2}U,\\
    \frac{R(U,V)^{T}U\Sigma V^{T}-V
      \Sigma^{T}U^{T}R(U,V)}{2}V \biggr).
\end{multline}
```

We claim that the projection $g(U,V)$ is given by the pair of matrices:

$$g(U,V) = \biggl(\frac{R(U,V)V\Sigma^{T}U^{T} - U\Sigma V^{T}R(U,V)^{T}}{2}U, \frac{R(U,V)^{T}U\Sigma V^{T} - V\Sigma^{T}U^{T}R(U,V)}{2}V\biggr). \tag{3}$$

Example 12: Subequations

```
We calculate the Fr\'{e}chet derivative of $F$ as follows:
\begin{subequations}
\begin{align}
  F'(U,V)(H,K)
  &= \langle R(U,V),H\Sigma V^{T} + U\Sigma K^{T} -
  P(H\Sigma V^{T} + U\Sigma K^{T})\rangle \label{eq:aa} \\
  &= \langle R(U,V),H\Sigma V^{T} + U\Sigma K^{T}\rangle
  \nonumber \\
  &= \langle R(U,V)V\Sigma^{T},H\rangle +
  \langle \Sigma^{T}U^{T}R(U,V),K^{T}\rangle. \label{eq:bb}
\end{align}
\end{subequations}
\Cref{eq:aa} is the first line, and \cref{eq:bb} is the last line.
```

We calculate the Fréchet derivative of F as follows:

$$\begin{aligned} F'(U,V)(H,K) &= \langle R(U,V), H\Sigma V^T + U\Sigma K^T - P(H\Sigma V^T + U\Sigma K^T)\rangle \qquad (4a)\\ &= \langle R(U,V), H\Sigma V^T + U\Sigma K^T\rangle \\ &= \langle R(U,V)V\Sigma^T, H\rangle + \langle \Sigma^T U^T R(U,V), K^T\rangle. \qquad (4b)\end{aligned}$$

Equation (4a) is the first line, and (4b) is the last line.

Example 13: Aligned equations

```
\Cref{eq:a,eq:b,eq:c} show three aligned equations.
\begin{align}
  f &= g \label{eq:a}, \\
  f' &= g' \label{eq:b}, \quad\text{and}\\
  \mathcal{L}f &= \mathcal{L}g \label{eq:c}.
\end{align}
```

Equations (5–7) show three aligned equations.

$$f = g, \tag{5}$$

$$f' = g', \quad \text{and} \tag{6}$$

$$\mathcal{L}f = \mathcal{L}g. \tag{7}$$

5. Theorem-like environments. SIAM uses the `ntheorem` package. Several theorem-like environments are predefined:

- `theorem`
- `lemma`
- `corollary`
- `definition`
- `proposition`

SIAM also defines a `proof` environment that automatically inserts a □ at the end of any proof, even if it ends in an equation environment. *Note that the document may need to be compiled twice for the mark to appear.* Some of the calculus examples were adapted from http://tutorial.math.lamar.edu/Classes/CalcI/MeanValueTheorem.aspx.

Example 14: Theorem

```
\begin{theorem}[Mean Value Theorem]\label{thm:mvt}
  Suppose $f$ is a function that is continuous on the closed interval
  $[a,b]$.  and differentiable on the open interval $(a,b)$.
  Then there exists a number $c$ such that $a < c < b$ and
  \begin{displaymath}
    f'(c) = \frac{f(b)-f(a)}{b-a}.
  \end{displaymath}
  In other words,
  \begin{displaymath}
    f(b)-f(a) = f'(c)(b-a).
  \end{displaymath}
\end{theorem}
```

THEOREM 1 (Mean Value Theorem). *Suppose f is a function that is continuous on the closed interval $[a,b]$. and differentiable on the open interval (a,b). Then there exists a number c such that $a < c < b$ and*

$$f'(c) = \frac{f(b) - f(a)}{b - a}.$$

In other words,

$$f(b) - f(a) = f'(c)(b - a).$$

Example 15: Corollary and proof

```
\begin{corollary}
  Let $f(x)$ be continuous and differentiable everywhere. If $f(x)$
  has at least two roots, then $f'(x)$ must have at least one root.
\end{corollary}
\begin{proof}
  Let $a$ and $b$ be two distinct roots of $f$.
  By \cref{thm:mvt}, there exists a number $c$ such that
  \begin{displaymath}
    f'(c) = \frac{f(b)-f(a)}{b-a} = \frac{0-0}{b-a} = 0.
  \end{displaymath}
\end{proof}
```

COROLLARY 2. *Let $f(x)$ be continuous and differentiable everywhere. If $f(x)$ has at least two roots, then $f'(x)$ must have at least one root.*

Proof. Let a and b be two distinct roots of f. By Theorem 1, there exists a number c such that

$$f'(c) = \frac{f(b) - f(a)}{b - a} = \frac{0 - 0}{b - a} = 0.$$

∎

SIAM provides commands to create your own theorem-, definition-, and remark-like environments:

- `newsiamthm` - Small caps header, italized body.
- `newsiamdefn` - Small caps header, normal body.
- `newsiamremark` - Italics header, normal body.

Example 16: New theorem-like environment

```
\newsiamthm{claim}{Claim} % <- Preamble
\begin{claim}\label{cl:constant}
  If $f'(x) = 0$ for all $x \in (a,b)$ then $f(x)$ is constant on $(a,b)$.
\end{claim}
\begin{proof}
  Left to reader.
\end{proof}
```

CLAIM 3. *If $f'(x) = 0$ for all $x \in (a, b)$ then $f(x)$ is constant on (a, b).*

Proof. Left to reader. ∎

Example 17: New definition-like environment

```
\newsiamdefn{defn}{Definition} % <- Preamble
\begin{defn}\label{defn:sym}
  We say a matrix $A$ is \emph{symmetric} if $a_{ij} = a_{ji}$ for all
    $i,j$.
\end{defn}
```

DEFINITION 4. We say a matrix A is *symmetric* if $a_{ij} = a_{ji}$ for all i, j.

Example 18: New remark-like environment

```
\newsiamremark{ex}{Example} % <- Preamble
\begin{ex}[Trivial note]\label{ex:a}
  Let $f(x) = 2$. Since $f'(x) = 0$ for all $x$, $f$ is constant
  everywhere.
\end{ex}
```

Example 5 (Trivial note). Let $f(x) = 2$. Since $f'(x) = 0$ for all x, f is constant everywhere.

Example 19: References

```
We can reference multiple types of objects with a single reference:
\cref{ex:a,cl:constant,thm:mvt}.
```

We can reference multiple types of objects with a single reference: Example 5, Claim 3, and Theorem 1.

6. Tables. Example 20 shows the code to generate Table 1. This example uses subfloats via the `subfig` package, as well as special column options from the `array` package.

Example 20: Example table with subtables.

```
\usepackage{array,subfig} % <- Preamble
\newcolumntype{R}{>{$}r<{$}}  %
\newcolumntype{V}[1]{>{[\;}*{#1}{R@{\;\;}}R<{\;]}} %
\begin{table}[htbp]
  \caption{Example table adapted from Kolda and Mayo \cite{KoMa14}.}
  \label{tab:KoMa14}
  \centering
  \subfloat[$\beta=1$]{
    \begin{tabular}{|c|R|V{3}|c|r@{\,$\pm$\,}l|} \hline
occ. & \multicolumn{1}{c|}{$\lambda$} & \multicolumn{4}{c|}{$\mathbf{x}$} &
fevals &  \multicolumn{2}{c|}{time (sec.)}\\ \hline
 718 & 11.3476 &  0.5544 &  0.3155 &  1.2018 &  0.0977 &   45 & 0.17 & 0.06 \\ \hline
 134 &  3.7394 &  0.2642 & -1.1056 &  0.2657 & -0.3160 &   31 & 0.12 & 0.05 \\ \hline
 144 &  2.9979 &  1.0008 &  0.4969 & -0.0212 & -0.4817 &   31 & 0.12 & 0.05 \\ \hline
   4 & \multicolumn{6}{c|}{\emph{--- Failed to converge ---}} & 0.21 & 0.10 \\ \hline
 \end{tabular}}

  \subfloat[$\beta=-1$]{
    \begin{tabular}{|c|R|V{3}|c|r@{\,$\pm$\,}l|} \hline
occ. & \multicolumn{1}{c|}{$\lambda$} & \multicolumn{4}{c|}{$\mathbf{x}$} &
fevals &  \multicolumn{2}{c|}{time (sec.)}\\ \hline
  72 & -1.1507 &  0.2291 &  0.6444 &  0.3540 & -0.8990 &   34 & 0.14 & 0.06 \\ \hline
 150 & -3.2777 &  0.8349 & -0.7603 & -0.3532 & -0.2635 &   33 & 0.14 & 0.07 \\ \hline
 148 & -3.5998 &  1.0486 &  0.6046 &  0.3736 &  0.3971 &   41 & 0.16 & 0.08 \\ \hline
 624 & -6.3985 &  0.1003 &  0.1840 &  0.5305 &  1.2438 &   48 & 0.19 & 0.08 \\ \hline
   4 & \multicolumn{6}{c|}{\emph{--- Converged to wrong solution ---}} & 0.10 & 0.11 \\ \hline
   2 & \multicolumn{6}{c|}{\emph{--- Failed to converge ---}} & 0.23 & 0.02 \\ \hline
 \end{tabular}}
\end{table}
```

7. Figures. Example 21 shows the code to generate Fig. 1. This example uses the `graphicx` package for the `\includegraphics` command. SIAM requires EPS figures for final production, but most people work in `pdflatex`. Therefore, we recommend the package `epstopdf` to automatically convert EPS images to PDF for inclusion in PDF documents created by `pdflatex`.

Table 1: Example table adapted from Kolda and Mayo [3].

(a) $\beta = 1$

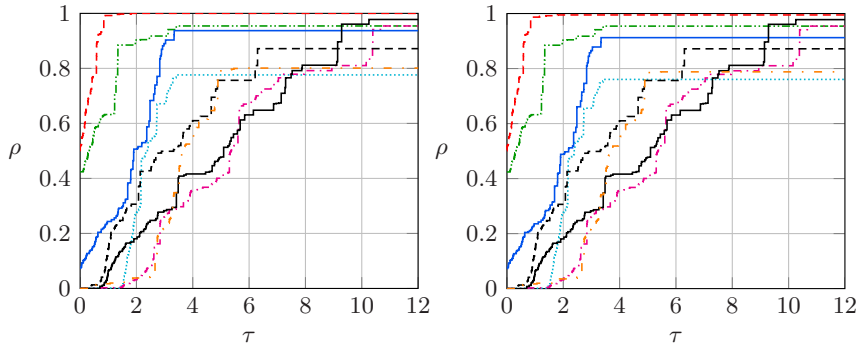
occ.	λ	$\mathbf{x}$	fevals	time (sec.)
718	11.3476	[0.5544 0.3155 1.2018 0.0977]	45	0.17 ± 0.06
134	3.7394	[0.2642 −1.1056 0.2657 −0.3160]	31	0.12 ± 0.05
144	2.9979	[1.0008 0.4969 −0.0212 −0.4817]	31	0.12 ± 0.05
4	— *Failed to converge* —			0.21 ± 0.10

(b) $\beta = -1$

occ.	λ	$\mathbf{x}$	fevals	time (sec.)
72	−1.1507	[0.2291 0.6444 0.3540 −0.8990]	34	0.14 ± 0.06
150	−3.2777	[0.8349 −0.7603 −0.3532 −0.2635]	33	0.14 ± 0.07
148	−3.5998	[1.0486 0.6046 0.3736 0.3971]	41	0.16 ± 0.08
624	−6.3985	[0.1003 0.1840 0.5305 1.2438]	48	0.19 ± 0.08
4	— *Converged to wrong solution* —			0.10 ± 0.11
2	— *Failed to converge* —			0.23 ± 0.02

Example 21: Example figure with subfigures and external files

```
\usepackage{graphicx,epstopdf,subfig} % <- Preamble
\begin{figure}[htbp]
  \centering
  \subfloat[$\epsilon_{\max}=5$]{\label{fig:a}\includegraphics{lexample_fig1}}
  \subfloat[$\epsilon_{\max}=0.5$]{\label{fig:b}\includegraphics{lexample_fig2}}
  \caption{Example figure using external image files.}
  \label{fig:testfig}
\end{figure}
```



(a) $\epsilon_{\max} = 5$ (b) $\epsilon_{\max} = 0.5$

Fig. 1: Example figure using external image files.

PGF is a TeX macro package for generating graphics. It is platform- and format-independent and works together with the most important TeX backend drivers, including pdftex and dvips. It comes with a user-friedly syntax layer called TikZ. More details can be found at http://sourceforge.net/projects/pgf/, and de-

tailed instructions are available in the manual. Example 22 shows the code to generate Fig. 2, which uses TikZ/PGF. This example was written by Henri Menke at http://texwelt.de/wissen/fragen/4912/skizze-zur-illustration-linearer-regression.

Example 22: Example TikZ/PGF for platform-independent graphics.

```
\usetikzlibrary{arrows,intersections} % <- Preamble
\begin{figure}[htbp]
  \centering
  \begin{tikzpicture}[
    thick,
    >=stealth',
    dot/.style = {
      draw,
      fill = white,
      circle,
      inner sep = 0pt,
      minimum size = 4pt
    }
    ]
    \coordinate (O) at (0,0);
    \draw[->] (-0.3,0) -- (8,0) coordinate[label = {below:$x$}] (xmax);
    \draw[->] (0,-0.3) -- (0,5) coordinate[label = {right:$f(x)$}] (ymax);
    \path[name path=x] (0.3,0.5) -- (6.7,4.7);
    \path[name path=y] plot[smooth] coordinates {(-0.3,2) (2,1.5) (4,2.8) (6,5)};
    \scope[name intersections = {of = x and y, name = i}]
    \fill[gray!20] (i-1) -- (i-2 |- i-1) -- (i-2) -- cycle;
    \draw      (0.3,0.5) -- (6.7,4.7) node[pos=0.8, below right] {Sekante};
    \draw[red] plot[smooth] coordinates {(-0.3,2) (2,1.5) (4,2.8) (6,5)};
    \draw (i-1) node[dot, label = {above:$P$}] (i-1) {} -- node[left]
    {$f(x_0)$} (i-1 |- O) node[dot, label = {below:$x_0$}] {};
    \path (i-2) node[dot, label = {above:$Q$}] (i-2) {} -- (i-2 |- i-1)
    node[dot] (i-12) {};
    \draw          (i-12) -- (i-12 |- O) node[dot,
    label = {below:$x_0 + \varepsilon$}] {};
    \draw[blue, <->] (i-2) -- node[right] {$f(x_0 + \varepsilon) - f(x_0)$}
    (i-12);
    \draw[blue, <->] (i-1) -- node[below] {$\varepsilon$} (i-12);
    \path       (i-1 |- O) -- node[below] {$\varepsilon$} (i-2 |- O);
    \draw[gray]      (i-2) -- (i-2 -| xmax);
    \draw[gray, <->] ([xshift = -0.5cm]i-2 -| xmax) -- node[fill = white]
    {$f(x_0 + \varepsilon)$}  ([xshift = -0.5cm]xmax);
    \endscope
  \end{tikzpicture}
  \caption{Example TikZ figure by Henri Menke.}
  \label{fig:tikz}
\end{figure}
```

8. Algorithms. **To do:** SIAM wants the algorithm caption to be small caps (which I have copied here), although I'm not sure why because this does not match the table and figures.

To do: I prefer `algpseudocode` to `algorihmic`. Should we include neither in the header and let the user choose?

Algorithm 1 is produced by the code in Example 23.

9. Sections and cross-referencing. Sections are denoted using standard LaTeX section commands, i.e., `\section`, `\subsection`, etc. The appendices are defined the same way except that the first one is preceded by the `\appendix` command. The acknowledgment section is preceeded by `\section*{Acknowledgments}`; it comes after any appendices and before the bibliography.

SIAM uses the `cleveref` package for cross-referencing, including customizations to adhere to SIAM's style guidelines. The macros automatically determine the proper way to format standard references, including the name of the reference and the hyperlink. Use `\Cref` for a reference at the beginning of a sentence and `\cref` otherwise.

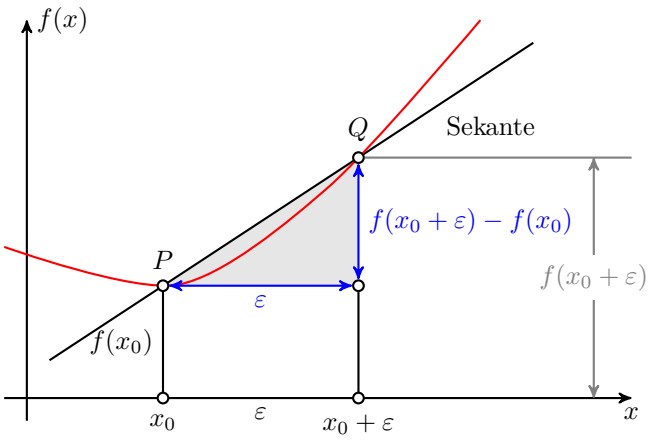


Fig. 2: Example TikZ figure by Henri Menke.

Example 23: Example algorithm

```
\usepackage{algorithmic} % <- Preamble
\begin{algorithm}
\caption{Build tree}
\label{alg:buildtree}
\begin{algorithmic}
\STATE{Define $P:=T:=\{ \{1\},\ldots,\{d\}$\}}
\WHILE{$\#P > 1$}
\STATE{Choose $C^\prime\in\mathcal{C}_p(P)$ with $C^\prime :=
     \operatorname{argmin}_{C\in\mathcal{C}_p(P)} \varrho(C)$}
\STATE{Find an optimal partition tree $T_{C^\prime}$ }
\STATE{Update $P := (P{\setminus} C^\prime) \cup \{ \bigcup_{t\in C^\prime} t \}$}
\STATE{Update $T := T \cup \{ \bigcup_{t\in\tau} t : \tau\in T_{C^\prime}{\setminus}
     \mathcal{L}(T_{C^\prime})\}$}
\ENDWHILE
\RETURN $T$
\end{algorithmic}
\end{algorithm}
```

A label for a section should always begin with `sec`. Example 24 shows how to reference sections.

To do: Hyperlinks are currently black, even though they are enabled. We may want to turn on some colors for testing purposes and/or to try different options.

To do: For some reason, the SIAM style does not have PDF bookmarks. Let's fix that.

To do: Explain how to automatically reference sections in the supplement.

ALGORITHM 1 Build tree

Define $P := T := \{\{1\}, \ldots, \{d\}\}$
while $\#P > 1$ **do**
  Choose $C' \in \mathcal{C}_p(P)$ with $C' := \operatorname{argmin}_{C \in \mathcal{C}_p(P)} \varrho(C)$
  Find an optimal partition tree $T_{C'}$
  Update $P := (P \backslash C') \cup \{\bigcup_{t \in C'} t\}$
  Update $T := T \cup \{\bigcup_{t \in \tau} t : \tau \in T_{C'} \backslash \mathcal{L}(T_{C'})\}$
end while
return T

Example 24: Right and wrong ways to reference a section

```
Inside a sentence\dots\\
Single: \cref{sec:intro}\\
Range: \cref{sec:intro,sec:front,%
sec:sec}\\
Multiple: \cref{sec:intro,sec:sec,%
sec:tab,sec:math,sec:thm}\\
Appendix: \cref{sec:changes}\\

Beginning of a sentence\dots\\
Single: \Cref{sec:intro}\\
Range: \Cref{sec:intro,sec:front,%
sec:sec}\\
Multiple: \Cref{sec:intro,sec:sec,%
sec:tab,sec:math,sec:thm}\\
Appendix: \Cref{sec:changes}\\


Just don't do it this way\dots\\
Section~\ref{sec:intro}
```

Inside a sentence...
Single: §1
Range: §§1, 2, and 9
Multiple: §§1, 4–6, and 9
Appendix: Appendix A

Beginning of a sentence...
Single: Section 1
Range: Sections 1, 2, and 9
Multiple: Sections 1, 4–6, and 9
Appendix: Appendix A

Just don't do it this way...
Section 1

10. Supplemental material. **To do:** Explain how to do supplementary material, including LaTeX files as well as multimedia.

No appendices in supplements!

11. Bibliography. The SIAM BibTeX style file, now called `siamplain.bst`, has been updated to include the new keys listed below:

- `doi`: Digital object identifier, a unique alphanumeric string
- `url`: Web address, usually impermanent
- `urldate`: Date that the web address was last accessed
- `eprint`: Archive identifier, a unique alphanumeric string
- `eprintclass`: Archive class
- `archive`: Archive URL, defaults to `http://arXiv.org/abs`
- `archivepreprint`: Archive name, defaults to "arXiv".
- `eid`: Article ID, if there are no page numbers
- `pagetotal`: Total number of pages, for use with article ID

Every entry type has been modified to include an optional link to a DOI, a URL, and/or an archive preprint reference. Additionally, the `article` entry now supports an Article ID, `eid`, and number of pages, `pagetotal`. To use this, include the following code in your LaTeX source code: `\bibliographystyle{siamplain}`.

11.1. DOI. A digital object identifier (DOI) is a unique alphanumeric string that provides a persistent link to its location on the Internet. The publisher assigns a DOI when your article is published and made available electronically. Using the `doi`

field in BibTeX to specify it, as shown for [3] in Example 25; observe the new `doi` field which produces a hyperlink in the citation. Do not include the full URL, i.e., `http://dx.doi.org/` preceding the DOI.

Example 25: Example article in BibTeX

```
@Article{KoMa14,
  title =        {An Adaptive Shifted Power Method for Computing
                  Generalized Tensor Eigenpairs},
  author =       {Tamara G. Kolda and Jackson R. Mayo},
  doi =          {10.1137/140951758},
  journal =      {SIAM Journal on Matrix Analysis and Applications},
  number =       {4},
  volume =       {35},
  year =         {2014},
  month =        dec,
  pages =        {1563--1581},
}
```

11.2. URL. There is also now support for the `url` field. Generally, the DOI is preferred to the URL, since the DOIs should be a permanent references. For that reason. it is good practice to specify the last date that the URL was accessed, which is specified by the optional `urldate` field. Reference [2] produced by Example 26 shows an example of using these fields.

Example 26: Example with the URL field in BibTeX

```
@Misc{Hi14,
  author =       {Nick Higham},
  title =        {A Call for Better Indexes},
  howpublished = {SIAM Blogs},
  year =         2014,
  month =        nov,
  url =          {http://blogs.siam.org/a-call-for-better-indexes/},
  urldate =      {2015-04-05}
}
```

11.3. Preprint servers such as arXiv. More and more manuscripts on available on preprint servers. In fact, SIAM's publication policy explicitly allows the final accepted version of any article to be posted on a preprint server such as arXiv.

For an arXiv paper, the `eprint` field is used to specify identifier. The optional `eprintclass` field specifies the class. Example 27 shows the BibTeX for [7].

Example 27: Example arXiv reference in BibTeX

```
@Misc{PeKoPi14,
  title = {Accelerating Community Detection by Using {K}-core Subgraphs},
  author =       {Chengbin Peng and Tamara G. Kolda and Ali Pinar},
  eprint =       {1403.2226},
  year =         2014,
  month =        mar,
  eprintclass =  {math.NA}
}
```

Other preprint servers are supported as well, but these require specification of the `archive` and `archiveprefix`. In this case, the target URL is formed by concatenating the `archive`, a forward slash (`/`), and the `eprint`; and the text for the hyperlink is formed by concatenating the `archiveprevix`, a color (:), and the `eprint`. Example 28 shows the code to generate [8], including the preprint from PubMed. Note that this example has both the journal citation as well as the link for the preprint.

Example 28: Example PubMed reference in BibTeX

```
@Article{WoZhMeSh05,
  author =       {Woessner, Donald E. and Zhang, Shanrong and
                  Merritt, Matthew E. and Sherry, A. Dean},
  title = {Numerical Solution of the {Bloch} Equations Provides Insights
                  into the Optimum Design of {PARACEST} Agents for {MRI}},
  journal =      {Magnetic Resonance in Medicine},
  doi =          {10.1002/mrm.20408},
  volume =       53,
  number =       4,
  month =        apr,
  year =         2005,
  pages =        {790--799},
  archiveprefix = {PubMed},
  archive =      {http://www.ncbi.nlm.nih.gov/pubmed},
  eprint =       {15799055}
}
```

11.4. Article ID. Some journals use an article ID rather than page numbers. The field `eid` specifies the article ID. The optional field `pagetotal` can say the number of pages in the document. An example of an article using these fields is shown in Example 29 for citation [6].

Example 29: Example article ID reference in BibTeX

```
@Article{Ne03,
  title =        {Properties of Highly Clustered Networks},
  author =       {Newman, M. E. J.},
  doi =          {10.1103/PhysRevE.68.026121},
  journal =      {Phys. Rev. E},
  volume =       {68},
  year =         {2003},
  eid =          {026121},
  pagetotal =    6,
  month =        aug,
}
```

To do: The new siam bib file is called `siamplain.bst`. There could also be a `siamalpha.bst` for alphabetic style references per the request of David Gleich.

Appendix A. Changes. The new SIAM styles includes the following significant changes as compared to older versions:

- Removed uppercase on title.

Appendix B. Acknowledgements go here. **To do:** Something is broken. There should not be an "Appendix" starting this, and the title is missing.

REFERENCES

[1] American Mathematical Society, *Mathematics Subject Classification*, 2010, http://www.ams.org/mathscinet/msc/msc2010.html (accessed 2015/03/29).

[2] Nick Higham, *A call for better indexes*. SIAM Blogs, Nov. 2014, http://blogs.siam.org/a-call-for-better-indexes/ (accessed 2015-04-05).

[3] Tamara G. Kolda and Jackson R. Mayo, *An adaptive shifted power method for computing generalized tensor eigenpairs*, SIAM Journal on Matrix Analysis and Applications, 35 (2014), pp. 1563–1581, doi:10.1137/140951758.

[4] Leslie Lamport, *LaTeX: A Document Preparation System*, Addison–Wesley, Reading, MA, 1986.

[5] Frank Mittlebach and Michel Goossens, *The LaTeXCompanion*, Addison–Wesley, 2nd ed., 2004.

[6] M. E. J. Newman, *Properties of highly clustered networks*, Phys. Rev. E, 68 (2003), 026121 (6 pages), doi:10.1103/PhysRevE.68.026121.

[7] Chengbin Peng, Tamara G. Kolda, and Ali Pinar, *Accelerating community detection by using K-core subgraphs*, Mar. 2014, arXiv:1403.2226 [math.NA].

[8] Donald E. Woessner, Shanrong Zhang, Matthew E. Merritt, and A. Dean Sherry, *Numerical solution of the Bloch equations provides insights into the optimum design of PARACEST agents for MRI*, Magnetic Resonance in Medicine, 53 (2005), pp. 790–799, doi:10.1002/mrm.20408, PubMed:15799055.

To do: This files creates a bunch of extra files as it compiles. Not sure how to remove them.