

Using LaTeX document class sugconf to write your paper

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Abstract	Description: SAS® software international conference, SAS Global Forum (SGF), now accepts papers written with the L ^A T _E X document preparation system which produces a .pdf.
	Purpose: This paper illustrates use of the LaTeX document class sugconf, shows a basic paper template and provides references to basic and advanced usage of LaTeX.
	Audience: SAS user group authors, particularly those using Jupyter Notebook
	Keywords: document preparation, markup language, ods latex, typesetting, text (.tex) to .pdf

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Introduction

Overview

Donald Knuth (1978) developed the T_EX typesetting software in order to typeset complex mathematical formulas.

Leslie Lamport (1984) wrote a set of macros known as L^AT_EX which provided the basic markup for document production.

T_EX and L^AT_EX are *markup* languages. A document consists of two parts: content: what the reader sees, and structure: what the markup language uses for organizing the pages in and of the document. Markup is concerned with standardizing the structure.

SAS

In SAS macro language there are two kinds of macro usage: macro variables and macro definitions.

Macro variables are allocated or (re-)assigned with the statement:

```
%let mvar = value;
```

References to macro variables are preceeded by ampersand:

```
&mvar %put &mvar;
```

Macro definitions are allocated with the pair of statements:

```
%macro xyz(parm(s)); ... %mend;
```

References to macro definitions are preceeded by percent sign:

```
%xyz %xyz(parm(s))
```

LaTeX

TeX and LaTeX call their macros *command strings*.

Backslash is the special character used in allocation and reference.

Command strings are allocated with the statement:

```
\new: \newcommand\xyz{text.0}
```

To reassign a command, use

```
\renew: \renewcommand\xyz{text.1}
```

References to command strings are preceeded by a backslash:

```
\xyz width=\textwidth
```

Command strings may be assigned with parameters:

```
\fx[n] \newcommand\xfx[2]{text #1, text #2}
```

References to command strings with parameters

are written with the parameters enclosed in curly brackets:

```
\fx{z} \section{Abstract}
```

References to command strings with optional parameters

are written with the options enclosed in square brackets:

```
\fx[y]{z} \includegraphics[width=0.5\textwidth]{banner-sgf-2021.png}
```

The basics

Overview

This is the overview, which consists of a list of topics in this section.

- document skeleton
 - document class article
 - command strings for maketitle
 - comparison of maketitle
-

document, skeleton

This document skeleton shows the four required elements of a document to be typeset.

```
\documentclass{?}%article, book, report, ..., sugconf
\begin{document}
text
\end{document}
```

The *preamble* consists of the single statement `\documentclass`, which defines the structures to be used. In other languages the `\documentclass` command is similar to a *configuration* (SAS), initialization, or standard library. The second and fourth statements `\begin{document}` and `\end{document}` are the *environment* of the text to be typeset.

doc class, article

This example shows a simple template of the article class.

```
% name: my-doc-LaTeX-article.tex
\documentclass{article}
\title{My Paper about Typesetting}
\author{R.J. Fehd}
\begin{document}
\maketitle
\tableofcontents
\section{Abstract}
LaTeX is a set of TeX macros
for marking up text documents to be typeset.
\end{document}
```

The first line is a comment with the name of the program; percent sign to the end of the line is a comment, i.e. there is no need for closure as in SAS `/*slash asterisk comment*/`.

In addition to the `\documentclass` command the *preamble* has two command strings — `\title` and `\author` — which are used in the command `\maketitle`.

The command `\section{Abstract}` performs two actions:

Abstract is typeset at the left margin in boldface `\textbf` and fontsize `\Large`, and that text is added to the list of items in the `\tableofcontents`.

command strings for maketitle

Class sugconf provides these command strings for use in \maketitle.

preamble	\sugconfbanner{ <i>filename.ext</i> }	filename.ext is a graphics file, e.g.: .jpg, .png
	\sugconfpapernumber{ <i>text</i> }	text is "Paper 999-<conf-year>"

Class sugconf provides three macro variables for use in the .tex document:

usage, in .tex	\SASregistered	SAS®
	\SASisRegisteredTrademark	SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc. in the USA and other countries. ® indicates USA registra- tion.
	\OtherTrademarks	Other brand and product names are trade- marks of their respective companies.

comparison

Figure 1 provides a comparison of the markup and results of classes `article` and `sugconf`.

Figure 1 comparison of maketitle in classes `article` and `sugconf`

maketitle: article

```
%name: hello-world-article.tex
\documentclass{article}
\title{Linear Models}
\author{Jim Goodnight}
\date{January 26, 1976}
\begin{document}
\maketitle
"Hello World"
\end{document}
```

Linear Models

Jim Goodnight

January 26, 1976

"Hello World"

maketitle: sugconf

```
%name: hello-world-sugconf.tex
\documentclass{sugconf}
\sugconfbanner{banner-sgf-2021.png}%
\sugconfpapernumber{Paper Sugi-76-03}%
\title{SAS Matrix}
\author{John Sall}
\begin{document}
\maketitle
Hello \SASregistered users
```

SAS® Global Forum 2021

Paper Sugi-76-03

SAS Matrix

John Sall

Hello SAS® users

```
% remember this boilerplate
% at end of document:
\SASisRegisteredTrademark
%if applicable: \OtherTrademarks
\end{document}
```

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product or service names are regis-
tered trademarks ...

What LaTeX provides

This is the overview, which consists of a list of topics in this section.

- markup commands
 - multiple authors
 - superscripts: SAS[®] Foobar[™]
 - graphics width
 - cross references: label, pageref, ref
 - environments figure, table
 - lists: description, enumerate, itemize
 - minipage
 - references: thebibliography
 - text font: texttt, verbatim
-

markup commands : special characters of SAS are also special characters in LaTeX

&, %, _ : `\&mvar`, `\%put`, `under_line`;

fill : horizontal: `\hfill`, vertical: `\vfill`

font specs :

sizes : `\small`, `\footnotesize`, `\scriptsize`, `\tiny`

styles : `\textit{italic}`, `\textsc{SMALL CAPS}`, `\textsl{slant}`,
`\texttt{text, monospace}`,

Jupyter : `\input{my-Jupyter-notebook}%.tex`

justify : inside an environment: `{\centering...}`

`\begin{center} ... \end{center}`

new line : `\newline` in lists,

`\|` in `\author`, `\title`, tabular environment

page break : `\newpage`

space :

horizontal : `\hspace{width}`: `\hspace{3em}`, `\quad`, `\qquad`

vertical : `\vspace{width}`: `\vspace{2\baselineskip}`,
`\smallskip`, `\medskip`, `\bigskip`; see also `\vfill`

width : `\textwidth`

multiple authors

`\author{name1 \| name2 \| ... nameN }`

The `\author` command may have several authors on separate lines by using double backslash between each name.

This markup for a *newline* may be used in `\title` as well.

The environment `tabular` also uses double backslash for a new line.

superscripts:

SAS[®]

foobar[™]

`\scriptsize textregistered\`

To place the ® symbol after mention of other software use the `\textsuperscript` command. The fontsize is `\scriptsize`.

The backslash (\) after the close curly bracket is necessary to provide a space after `\textregistered` or `\texttrademark`.

graphics width

`\includegraphics[width=0.5\textwidth]{banner-conf-year.png}`

The `\includegraphics` command has a required parameter of `{filename.ext}`. Its optional parameters are enclosed in square brackets. Use the `[width=<fraction>\textwidth]` to ensure the graphic fits inside the page.

note: The `graphicx` package provides command `\includegraphics`; it is loaded by class `sugconf`.

environments
figure, table

The page number can be referenced with the `\pageref{key}` command.

usage, in .pdf As shown in section 1, on page 5 ...
See also the command `\nameref`, section 2, on page 11, which provides
the name of this section: What LaTeX provides

```
usage, in .tex \begin{figure}[h]%placement: h=here,t=top,b=bottom,p=separate page
\centering
\includegraphics[width=0.5\textwidth]{banner-sgf-2021.png}
\caption{description of figure}%convention: below the item
\label{fig:test} %optional
\end{figure}

\begin{table}
\caption{this table is a float}%convention: above the text
\label{tbl:test}
\begin{tabular}{lll} % columns, justify: left center right
\hline % hline: horizontal line
example & & % ampersand: column separator
& tabular & \\\ % double backslash: newline
which has & been 'floated' & \\
to top & & of page & \\\ \hline
\end{tabular}
\end{table}
```

usage, in .pdf



Table 1 this table is a float

example	tabular
which has	been 'floated'
to top	of page

note: The minipage environment, shown below, also provides an unbreakable box.

lists

```
\begin{list} \item... \item... \end{list}
```

Three *environments* are provided for lists:
description, enumerate, and itemize.

Figure 3 environments for lists: description, enumerate, itemize

description :	<pre>\begin{description} \item[this is] a labeled list \item[descriptors] must be enclosed in square brackets \end{description}</pre>	<p>this is : a labeled list</p> <p>descriptors : must be enclosed in square brackets</p>
enumerate :	<pre>\begin{enumerate} \item numbered list \item the second line \end{enumerate}</pre>	<p>1. numbered list</p> <p>2. the second line</p>
itemize :	<pre>\begin{itemize} \item bulleted list \item the 2nd item \end{itemize}</pre>	<ul style="list-style-type: none"> • bulleted list • the 2nd item

minipage

```
\begin{minipage}{width} ... \end{minipage}
```

The minipage environment provides an unbreakable box. All of the side-by-side examples in this paper are constructed with this method.

```
\begin{minipage}{0.45\textwidth}
left
\end{minipage}
\hfill %horizontal fill with blanks
\begin{minipage}{0.45\textwidth}
right
\end{minipage}
```

references

```
\begin{thebibliography} \bibitem{key} \end{thebibliography}
```

The basic *environment* for references is `thebibliography`.
Within the environment are one or more `\bibitem{cite-key}` items.
Use the markup `\cite{cite-key-n}` to refer to the bibitems.

Figure 4 environment thebibliography

usage, in .tex `\begin{thebibliography}{9}` `%9=n(bibitem); 99 for more than 10`

```
\bibitem{example.plain} %\cite{example.plain}: [1]
```

```
\bibitem[ex.lbl]{example.label} %\cite{example.label}: [ex.lbl]
```

```
\bibitem[label]{cite-key}
Author, (year), "title".
In: \textit{conference}.
\textsc{url:} \url{...}.
```

```
\end{thebibliography}
```

See the typeset results for this paper in
section 2, References, on page 12.

text font

```
\texttt{text}, \begin{verbatim} ... \end{verbatim}
```

Two markups are available to typeset text in typewriter (monospace) font:
`\texttt{text}` and the *environment* `verbatim`.

! → Remember that SAS special characters of the macro language, ampersand
and percent, must be preceded by backslash when used in `\texttt`.

```
\texttt{\%put echo: \&=mvar;} %put echo: &=mvar;
```

```
\begin{verbatim}
%let mvar = value; %let mvar = value;
%put echo: &=mvar; %put echo: &=mvar;
\end{verbatim}
```

See also the `fancyvrb` packages on page 10 which provides the `Verbatim`
environment with options to control the font size of the text.

Advanced usage

Overview

This is the overview, which consists of a list of topics in this section.

- `booktabs` <https://ctan.org/pkg/booktabs>
- `caption` <https://ctan.org/pkg/caption>
- `fancy verbatim` <https://ctan.org/pkg/fancyvrb>
- `hyperref` <https://ctan.org/pkg/hyperref>
- `nameref` <https://ctan.org/pkg/nameref>
- `statrep` <https://ctan.org/pkg/statrep>

booktabs

Package `booktabs` provides command `\toprule`, `\midrule`, and `\bottomrule` which replace `\hrule` in the `tabular` environment

preamble `\usepackage{booktabs}`

Figure 5 environment `tabular`, enhancements

usage, in .tex	<code>\begin{tabular}{ll}\hline</code>	<code>\begin{tabular}{ll}\toprule</code>
	<code>a&b\\</code>	<code>a&b\\</code>
	<code>c&d\\</code>	<code>c&d\\</code>
	<code>\hline</code>	<code>\midrule</code>
	<code>e&f\\</code>	<code>e&f\\</code>
	<code>g&h\\</code>	<code>g&h\\</code>
	<code>\hline</code>	<code>\bottomrule</code>
	<code>\end{tabular}</code>	<code>\end{tabular}</code>

usage, in .pdf

a	b	a	b
c	d	c	d
e	f	e	f
g	h	g	h

Note the difference in the thickness of the top and bottom rules, as well as the extra space above and below the rules.

caption

The caption packages provides an alternative to the figure and table environments which *float*; i.e. the *box* of the illustration may be moved to top or bottom, or even a new page.

If you want your figure or table exactly Here then use this.

```
preamble \usepackage%{caption}%\captionof{figure|table}{...\label{...}}
          [font=bf%
          ,justification=raggedright%
          ,labelsep=quad%colon newline period quad=1em qquad=2em space
          ,singlelinecheck=false]
          {caption}%
```

Figure 6 environments figure and table, placement=Here

usage, in .tex Figure \ref{sec:fig:xyz}, \nameref{sec:fig:xyz} illustrates

```
\captionof{figure}{example figure: graphic of something%description
\label{sec:fig:xyz}}%note two close curly brackets
                    %the label is inside the captionof description
```

```
Table \ref{sec:tbl:xyz}, \nameref{sec:tbl:xyz} shows
```

```
\captionof{table}{example table: lookup table as format%
\label{sec:tbl:xyz}}%
```

usage, in .pdf Figure 7, example figure: graphic of something illustrates

Figure 7 example figure: graphic of something

Table 2, example table: lookup table as format shows

Table 2 example table: lookup table as format

fancy verbatim

The markup examples have been shown using the fancyvrb package environment Verbatim, which provides an option to change the fontsize.

Font sizes are: \small, \footnotesize, \scriptsize, and \tiny.

```
preamble \usepackage{fancyvrb}%FancyVrb setup:
          \fvset{frame=bottomline}%topline bottomline lines single
```

```
usage, in .tex \begin{Verbatim}[fontsize=\small]
PROC freq data = sashelp.class;
               tables sex / list missing noprint
               out = work.freq_class_sex;

run;
\end{Verbatim}
```

```
usage, in .pdf PROC freq data = sashelp.class;
               tables sex / list missing noprint
               out = work.freq_class_sex;

run;
```

note: To echo programs use \VerbatimInput{filename.sas}.
For multi-page programs use options firstline and lastline.

```
\newcommand\FileNameExt{proc-freq.sas}
\VerbatimInput[lastline=40]{\FileNameExt}
\newpage
\VerbatimInput[firstline=41,lastline=80]{\FileNameExt}
```

hyperref	<p>Package hyperref provides <code>\href</code> and <code>\url</code>. <code>href</code> has two arguments: <code>\href{url}text</code> <code>url</code> has one argument: <code>\url{url}</code></p> <p>preamble None; hyperref is loaded by class sugconf. usage, in .tex <code>\href{https://ctan.org/}{Comprehensive TeX Archive Network}</code> <code>\url{https://ctan.org/}</code> Comprehensive TeX Archive Network https://ctan.org/</p>
nameref	<p>The <code>nameref</code> package provides a method to obtain the text of the caption of a figure or table.</p> <p>preamble <code>\usepackage{nameref}</code> usage, in .tex reference to figure <code>\ref{sec:fig:xyz}</code>, <code>\nameref{sec:fig:xyz}</code>, on page <code>\pageref{sec:fig:xyz}</code></p> <p>usage, in .pdf reference to figure 7, example figure: graphic of something, on page 10.</p>
statrep	<p>The <code>statrep</code> package provides two environments and two tags that work together to display your SAS code and results and to generate the SAS program that produces those results. The two environments (<code>Datastep</code> and <code>Sascode</code>) display SAS code. The two tags (<code>Listing</code> and <code>Graphic</code>) display SAS output. These environments are output from ODS latex destination. See [statrep.cls] and [ODS latex] for usage.</p> <p>preamble <code>\usepackage{statrep}</code> usage, in .tex <code>\input{my-statrep-output}%.tex</code></p>

Other classes and packages

beamer	<p>The <code>beamer</code> class changes page specifications to landscape to fit one page to screen size, similar to <code>.ppt</code>. The <code>.tex</code> document (<code>my-doc-as-main.tex</code>) can also be processed to provide an article: <code>my-doc-as-article.pdf</code>. See the appendix, page 13, for examples.</p>
pdfpages	<p>The <code>pdfpages</code> package provides a method to copy pages from another <code>.pdf</code> (<code>my-doc-as-ppt.pdf</code>) into the document. This is useful for creating a 4-up handout of a beamer presentation: <code>my-doc-as-ppt-4up-handout.pdf</code>. See the appendix, page 13, for examples.</p>
refart	<p>The <code>reference manual</code> class provides a wide left margin for section titles. The layout is based on Robert E. Horn's Information Mapping® discipline as outlined in his book Mapping Hypertext . This document was marked up using the <code>refart</code> class.</p>

Conclusion

SAS macro language is similar to LaTeX markup; each has a set of special characters which are used to access functions. LaTeX has functions which can typeset the special characters of SAS macro language, ampersand and percent.

Recommended reading LaTeX2e for authors,
<http://mirrors.ctan.org/macros/latex/base/usrguide.pdf>
 LaTeX2e-reference-manual.pdf
<http://tug.ctan.org/info/latex2e-help-texinfo/latex2e.pdf>
 web pages: <https://latexref.xyz/>
 The Comprehensive LaTeX Symbol List: Over 14000 symbols listed in tables
<http://tug.ctan.org/info/symbols/comprehensive/symbols-a4.pdf>

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References

	download TeXlive:	https://tug.org/texlive/
[beamer.cls]	A LaTeX class for producing presentations and slides	https://ctan.org/pkg/beamer
[booktabs.sty]	Publication quality tables in L ^A T _E X	https://ctan.org/pkg/booktabs
[caption.sty]	Customising captions in floating environments	https://ctan.org/pkg/caption
[fancyvrb.sty]	Sophisticated verbatim text.	https://ctan.org/pkg/fancyvrb
[pdfpages.sty]	Include PDF documents in LaTeX	https://ctan.org/pkg/pdfpages
[refman.cls]	Format technical reference manuals	https://ctan.org/pkg/refman
[statrep.cls]	Displays SAS code and results of running the code via ods latex	https://ctan.org/pkg/statrep
[sugconf.cls]	SAS(R) user group conference document class.	https://ctan.org/pkg/sugconf
bricolage		
[latex2e-help-texinfo]	A reference manual for L ^A T _E X.	https://ctan.org/pkg/latex2e-help-texinfo
[latex.org]	LaTeX.Community.org	https://latex.org/forum/
[latex-project.org]	The LaTeX Project	https://www.latex-project.org/
[texfaq.org]	TeX FAQ	http://www.texfaq.org/
[TeX User Group]	The TeX showcase	https://tug.org/texshowcase/
[ODS latex]	Creating Journal Ready Tables with Special Characters Using ODS LaTeX, Steven Feder	https://support.sas.com/resources/papers/proceedings14/2033-2014.pdf
	Using SAS and LaTeX to Create Documents with Reproducible Results, Tim Arnold and Warren F. Kuhfeld	https://support.sas.com/resources/papers/proceedings12/324-2012.pdf
	Professional outputs with ODS LaTeX, Arnaud Dauchy and Solenn Le Guennec	https://www.lexjansen.com/phuse/2008/tu/TU04.pdf
packages provided by \documentclass{sugconf}		
[graphicx.sty]	Enhanced support for graphics	https://ctan.org/pkg/graphicx
[hyperref.sty]	Extensive support for hypertext in L ^A T _E X.	https://ctan.org/pkg/hyperref
[inputenc.sty]	Accept different input encodings.	https://ctan.org/pkg/inputenc
[upquote.sty]	Show "realistic" quotes in verbatim. change 'single curly quotes' and "double curly quotes" to 'upright' "quotes"	https://ctan.org/pkg/upquote
[url.sty]	Verbatim with URL-sensitive line breaks.	https://ctan.org/pkg/url

Appendix: example document listings

Beamer suite

```
main
%name: my-doc-as-main.tex
%\usepackage{fancyvrb}%\VerbatimInput{proc-freq.sas}
\begin{document}
text
\end{document}

article=sugconf
%name: my-doc-as-sugconf.tex
\documentclass{sugconf}
\usepackage[notheorems]{beamerarticle}
\input{my-doc-as-main}%.tex
\endinput

ppt
%name: my-doc-as-ppt.tex
\documentclass{beamer}
%% Setup appearance: usetheme
\usetheme{Berlin}%banner:top
\usefonttheme{default}
\input{my-doc-as-main}%.tex
\endinput

ppt 4-up handout
%name: my-doc-as-ppt-4up-handout.tex
\documentclass{article}
\usepackage{pdfpages}
\begin{document}
\includepdf[landscape,nup=2x2,pages=--]
{my-doc-as-ppt}%.pdf
\end{document}
```

SAS-user-group-paper-Latex-class-sugconf.tex

```
%name: SAS-user-group-paper-Latex-class-sugconf.tex
\documentclass{sugconf}
\sugconfbanner{banner-sgf-2021}%.png
\sugconfpapernumber{Paper 999-2021}
\title{SAS User Group Sample Paper
using LaTeX class sugconf}
\author{Author 1 name, ABC Corporation %;
%\ %newline
%Author 2 name, DEF Corporation;
%\ %newline
%Author 3 name, GHJ University
}%end author
%to use packages remove % in column.1
%\usepackage{booktabs}%\toprule \midrule \bottomrule
%\usepackage{caption}%\captionof{figure|table}{description\label{x:y:z}}
%\usepackage{fancyvrb}%\VerbatimInput[options]{filename.sas}
%\usepackage{nameref}%\nameref{x:y:z}
%\usepackage{statrep}%\input{my-ods-latex-output}%.tex
\begin{document}\maketitle
\section{ABSTRACT}%(heading 1)
This paragraph includes the first reference to
\SASregistered
software

\tableofcontents\hrulefill%use for rough draft, disable for final

\section{INTRODUCTION}%(heading 1)
This paragraph expands on the abstract.

\section{FIRST MAIN TOPIC}%(heading 1)

\subsection{SUBHEAD A}%(heading 2)

\subsubsection{Subsubhead A.1}%(heading 3)
```

```

Example citations:
\cite{example.plain}
\cite{example.label}
\cite{cite-article}

\newpage %
\section{Environments}

\subsection{Figures, or tables}

\begin{figure}[h]
\begin{center}
graphic here:
%\includegraphics
%[height=12\baselineskip,
% width=0.25\textwidth
% ]%
%{article-hello-world.pdf}
\caption{about this graphic}
\label{fig.1}%optional
\end{center}
\end{figure}

\begin{table}[h]
\centering
\caption{lookup table for ...}
\label{tbl.1}%optional
text here:
\begin{tabular}{lcr}\hline
left & center & right
\\ \hline
\hline
\end{tabular}
\end{table}

\subsection{Lists}

This is a labeled list:

\begin{description}
\item[x] description of x
\item[y] need to know about y
\end{description}

Here is the numbered list:

\begin{enumerate}
\item a
\item b
\end{enumerate}

And last, bulleted:

\begin{itemize}
\item 1
\item 2
\end{itemize}

\subsection{Program listing}
If you need to include source code,
introduce it with a sentence that ends with a colon:

\begin{verbatim}
%let mvar = value;
%put echo: &mvar;
\end{verbatim}

use fontsize=small for log
{\small
\begin{verbatim}
echo: &mvar;
\end{verbatim}
}%end log

use fontsize=(footnotesize | scriptsize | tiny) for listing
{%\footnotesize

```

```

\scriptsize
%\tiny
\begin{verbatim}
WORK.CLASS

Obs      Name      Sex      Age      Height      Weight
  1      Alfred      M       14       69.0       112.5
  2      Alice       F       13       56.5       84.0
  3      Barbara      F       13       65.3       98.0
\end{verbatim}
}%end listing

\section{CONCLUSION}

%\newpage %
\begin{thebibliography}{9}          %9=n(bibitem); 99 for more than 10
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Journal title.

\bibitem[LexJansen.com]{cite-website}
%Author
"SAS Conference Proceedings (1976 - present)".
Available at \url{https://www.lexjansen.com/}.

\end{thebibliography}

\section*{Acknowledgments}%* asterisk: not in table.of.contents
\section*{Recommended Reading}
\section*{Author Information}

Your comments and questions are valued and encouraged. Contact the author at:

\begin{tabular}{l@{: }l}
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%Phone & 634-5789 \\%(optional))
E-mail &\url{mailto:abc@corp.com} \\
%Web &\url{} \\ %(optional)
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