

# Writing Papers Using $\text{\LaTeX}$

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Q-APS  $\text{\LaTeX}$  Workshop  
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- Purpose of this workshop
  - ① Basics of how to use  $\text{\LaTeX}$
  - ② Not advanced
  - ③ Neither slides nor posters (Oct. 30)
- Why  $\text{\LaTeX}$ ?
  - ① Easy to change the document style
  - ② Easy to lay out tables and figures (fully automated)
  - ③ Easy to write beautiful math expressions
  - ④ Easy to create references (BibTeX)

# Structure of Document

- Preamble
- Body
  - Chapter (if book)
  - Section
  - Subsection
  - $\vdots$

```
\documentclass[12pt]{article}
% Preamble
\begin{document}
% Body
\section{How to use {\LaTeX}}
\subsection{Figures}
\end{document}
```

# Preamble

- Settings that apply to the whole document

- ➊ Margins
- ➋ New commands
- ➌ Packages

```
% document class, font size
\documentclass[12pt]{article}

% margins
\addtolength{\hoffset}{-0.75in}
\addtolength{\voffset}{-0.75in}
\addtolength{\textwidth}{1.5in}
\addtolength{\textheight}{1.5in}

% allow page break within math environments
\allowdisplaybreaks[4]

% define new commands for math
\newcommand\E{\mathbb{E}}
```

```

% basic packages
\usepackage{setspace} % spacing
\usepackage{latexsym,amssymb,amsmath, bm} % math
\usepackage{graphicx} % graphics
% bibliography packages
\usepackage{natbib}
\bibpunct{(}{)}{;}{a}{}{,}
\bibliographystyle{apsr}
% dcolumn package: table
\usepackage{dcolumn}
\newcolumntype{.}{D{.}{.}{-1}}
\newcolumntype{d}[1]{D{.}{.}{#1}}
% multirow package: table
\usepackage{multirow}
% dotted lines in tables
\usepackage{arydshln}
% spacing between sections and subsections
\usepackage[compact]{titlesec}

```

# Title Page

- Title with acknowledgement
- Author with contact information
- Date

```
% Title
\title{
Sample {\LaTeX} Document\thanks{Prepared for {\LaTeX}
Workshops sponsored by the Program for Quantitative
and Analytical Political Science, Department of
Politics, Princeton University}
}
```

```
% Author
\author{
Yuki Shiraito\thanks{Ph.D. candidate, Department of
Politics, Princeton University, Princeton, NJ
08544-1012. Email:
\href{mailto:shiraito@princeton.edu}{shiraito@princeton
}
}

% Date
\date{
October 26, 2012
}

% make title page
\maketitle
```

# Text

- Section, subsection, subsubsection, ...
- Font styles
- Quotations

```
\section{First Section}  
\subsection{First Subsection}  
\subsubsection{First Subsubsection}  
Hello!
```

This starts a new paragraph

```
\noindent  
\textit{Italic}, \textsc{small capital}
```



Quotations: ``Right, as the world goes, is only in question between equals in power, while the strong do what they can and the weak suffer what they must.'' (Thucydides, \textit{The Melian Dialogue})

```
\begin{quotation}
...the life of man, solitary, poor, nasty, brutish,
and short. (Hobbes, \textit{Leviathan})
\end{quotation}
```

# Mathematical Expressions

- Within texts
- “equation” environment
- “align” environment

```
\textsc{Uniform Continuity} Let  $(X, d)$  and  $(Y, \rho)$  be two metric spaces, and  $f$  be a function from  $X$  to  $Y$ . Let  $A$  be a subset of  $X$ . Then,  $f$  is \textit{uniformly continuous in}  $A$  if and only if for all  $x, x' \in A$  and for all  $\epsilon > 0$ , there exists  $\delta(\epsilon)$  independent of  $x, x'$  such that  $d(x, x') < \delta(\epsilon) \Rightarrow \rho(f(x), f(x')) < \epsilon$ .
```

`\textsc{Taylor's Theorem}` Let  $f$  be defined on  $(a, b)$ . Suppose the  $n^{\text{th}}$  derivative  $f^{(n)}$  exists on  $(a, b)$ . Then for all  $x, x_0 \in (a, b)$  with  $x \neq x_0$  we can express

$$f(x) = f(x_0) + \sum_{k=1}^{n-1} \frac{f^{(k)}(x_0)}{k!} (x - x_0)^k + R_n(x, x_0).$$

`\textsc{Lebesgue's dominated convergence theorem}`

Let

$g, f_1, f_2, \dots$  be measurable such that  
 $\int |g| d\mu < \infty$ ,  $|f_n| \geq g$  almost  
everywhere for all  $n$ , and  $f_n \rightarrow f$   
almost everywhere. Then,

`\begin{align}`

$\int |f| d\mu \geq \int |g| d\mu,$

`\label{034018_26Oct12} \\\`

$\lim_{n \rightarrow \infty} \int f_n d\mu =$

$\int f d\mu$ , `\;` `\text{and}` `\\\`

$\int |f - f_n| d\mu \rightarrow 0$  `\;` `\text{for}`

`\;`  $n \rightarrow \infty$ .

`\end{align}`

# Figures

- “graphicx” package
- “figure” environment
- “include graphics” command
- Captions

```
\begin{figure}[h] % put the graph here!  
  \begin{center}  
    \includegraphics[scale=.7]{evdfnctions.pdf}  
    \caption{The Density and Distribution Functions  
of Type I Extreme Value Distribution}  
    \label{fig:evd}  
  \end{center}  
\end{figure}
```

# Tables

- “table” and “tabular” environment
- “dcolumn” package

```
\begin{table}[p]
  \begin{center}
    \begin{tabular}{lrrrrrrr|rrrrr}
      \hline
      \hline
      & & & & & & & \multicolumn{2}{c}{Violent events}
    \end{tabular}
  \end{center}
\end{table}
```

- Tables, figures, and equations are automatically numbered
- “ref” and “eqref” commands always give the correct numbers

```
Table~\ref{tb:design}, Figure~\ref{fig:evd}, Section~\ref{sec:evd},  
Equation~\eqref{034018_26Oct12}.
```

# Citations

- Create bibliography file
- “citet” or “citep” commands
- Run pdflatex, bibtex, pdflatex, and pdflatex (in this order)

In .bib file...

```
@Book{scott76:_moral_econom_of_peasan,  
  author =    {Scott, James C.},  
  title =     {The Moral Economy of the Peasant: Rebelli  
               Subsistence in Southeast Asia},  
  publisher = {Yale University Press},  
  year =     1976,  
  address =   {New Haven}}
```



```

@Article{dempster77:_maxim_likel_incom_data_em_algor,
  author =    {Dempster, A. P. and Laird, N. M. and Rubin, D. B.},
  title =     {Maximum Likelihood from Incomplete Data via the
               EM Algorithm},
  journal =   {Journal of the Royal Statistical Society
               (Methodological)},
  year =      1977,
  volume =    39,
  number =    1,
  pages =     {1--38}}

```

In .tex file...

```
\citet{scott76:_moral_econom_of_peasan}
```

```
\citep{dempster77:_maxim_likel_incom_data_em_algor}.
```