Outline

Concepts

LaTeX Usage
Sample Document
Compiling Process
LaTeX Basics
Compiling Process Revisited
Mathematics: Equations & Formulas
References & Citations

LaTeX References
Classic Books
Tutorials & Introductions
Software & Packages
My Own Practice

Conclusions

# A Brief Introduction to LaTeX

## Concepts, Usage, and References

Ying-ping Chen

Natural Computing Laboratory
Department of Computer Science
National Chiao Tung University
HsinChu City, TAIWAN

07/20/2005

# Outline

Outline

Concepts

LaTeX Usage

Sample Document
Compiling Process
LaTeX Basics
Compiling Process Revisited
Mathematics: Equations & Formulas
References & Citations

LaTeX References

Classic Books
Tutorials & Introductions
Software & Packages
My Own Practice

Conclusions

1 Concepts

2 LaTeX Usage

3 LaTeX References

4 Conclusions

Outline

Concepts

LaTeX Usage

Sample Document

Compiling Process

LaTeX Basics

Compiling Process Revisited

Mathematics: Equations & Formulas

References & Citations

LaTeX References

Classic Books

Tutorials & Introductions

Software & Packages

My Own Practice

Conclusions

# Concepts

- Typesetting System vs. Word Processor
  - Typesetting Commands in Text
  - WYSIWYG: Office, Word, etc...
- TeX and LaTeX
  - TeX: Donald E. Knuth
  - LaTeX: Leslie Lamport
- LaTeX 2.09, LaTeX $2_\varepsilon$, and LaTeX3
  - LaTeX $2_\varepsilon$: Current Version to Use

Outline

Concepts

LaTeX Usage

Sample Document
Compiling Process
LaTeX Basics
Compiling Process Revisited
Mathematics: Equations & Formulas
References & Citations

LaTeX References

Classic Books
Tutorials & Introductions
Software & Packages
My Own Practice

Conclusions

# LaTeX Usage

1 Concepts

2 LaTeX Usage
- Sample Document
- Compiling Process
- LaTeX Basics
- Compiling Process Revisited
- Mathematics: Equations & Formulas
- References & Citations

3 LaTeX References

4 Conclusions

Outline

Concepts

LaTeX Usage

Sample Document

Compiling Process

LaTeX Basics

Compiling Process Revisited

Mathematics: Equations & Formulas

References & Citations

LaTeX References

Classic Books

Tutorials & Introductions

Software & Packages

My Own Practice

Conclusions

# Sample Document: Source Text File

sampleDoc-01.tex

```
% Specify the document class and options
\documentclass[a4paper]{article}

\begin{document}
% Make title page: Begin
\title{Sample Document No. 1}
\author{Ying-ping Chen}
\date{\today}
\maketitle
% Make title page: End

This is some inner text.

\end{document}
```

# Sample Document: Generated PDF File

## sampleDoc-01.pdf

Outline

Concepts

LaTeX Usage

Sample Document

Compiling Process

LaTeX Basics

Compiling Process Revisited

Mathematics: Equations & Formulas

References & Citations

LaTeX References

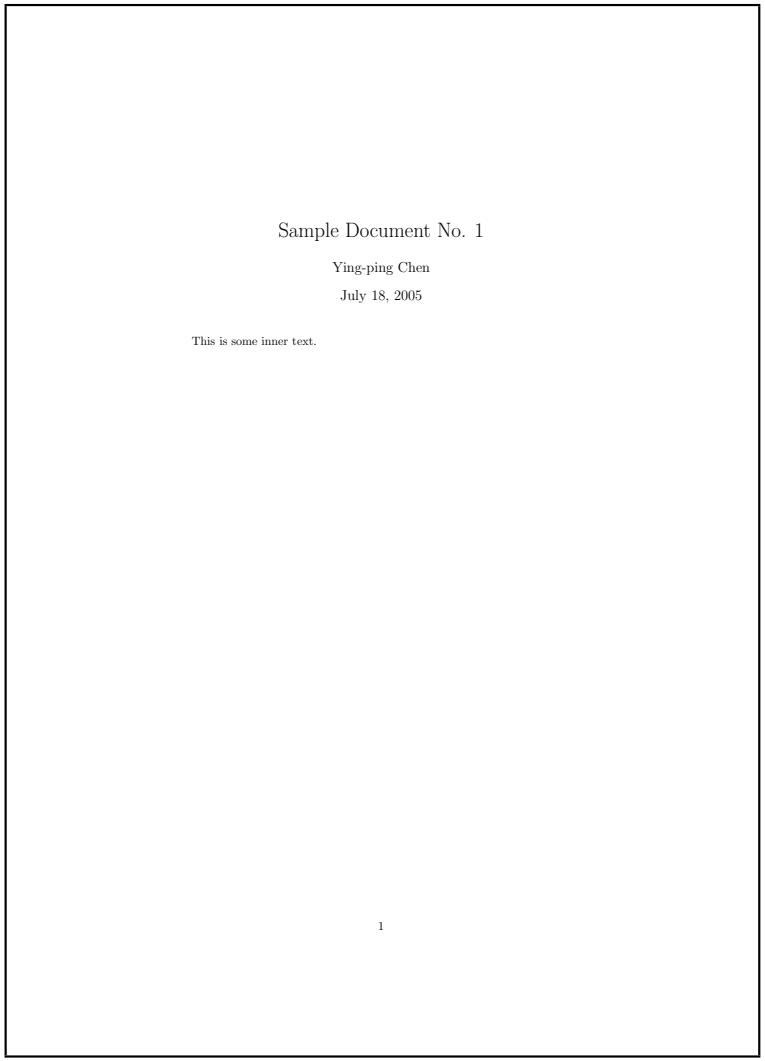
Classic Books

Tutorials & Introductions

Software & Packages

My Own Practice

Conclusions



Sample Document No. 1

Ying-ping Chen

July 18, 2005

This is some inner text.

1

Outline

Concepts

LaTeX Usage

Sample Document

Compiling Process

LaTeX Basics

Compiling Process Revisited

Mathematics: Equations & Formulas

References & Citations

LaTeX References

Classic Books

Tutorials & Introductions

Software & Packages

My Own Practice

Conclusions

# Compiling Process

## Generating PostScript/PDF Files

- Old Way
  1. .tex → .dvi: `latex` sampleDoc-01
  2. .dvi → .ps: `dvips` -o sampleDoc-01.ps sampleDoc-01
  3. .ps → .pdf: `ps2pdf` sampleDoc-01.ps

Outline

Concepts

LaTeX Usage

Sample Document

Compiling Process

LaTeX Basics

Compiling Process Revisited

Mathematics: Equations & Formulas

References & Citations

LaTeX References

Classic Books

Tutorials & Introductions

Software & Packages

My Own Practice

Conclusions

# Compiling Process

## Generating PostScript/PDF Files

- Old Way
  1. .tex → .dvi: `latex` sampleDoc-01
  2. .dvi → .ps: `dvips` -o sampleDoc-01.ps sampleDoc-01
  3. .ps → .pdf: `ps2pdf` sampleDoc-01.ps
- New Way
  1. .tex → .pdf: `pdflatex` sampleDoc-01

Outline

Concepts

LaTeX Usage

Sample Document

Compiling Process

LaTeX Basics

Compiling Process Revisited

Mathematics: Equations & Formulas

References & Citations

LaTeX References

Classic Books

Tutorials & Introductions

Software & Packages

My Own Practice

Conclusions

# Compiling Process

## Generating PostScript/PDF Files

- Old Way
  1. .tex → .dvi: `latex` sampleDoc-01
  2. .dvi → .ps: `dvips` -o sampleDoc-01.ps sampleDoc-01
  3. .ps → .pdf: `ps2pdf` sampleDoc-01.ps
- New Way
  1. .tex → .pdf: `pdflatex` sampleDoc-01
- Readers & Viewers
  - DVI: xdvi, DVI Viewer, YAP
  - PostScript: Ghostscript + Ghostview
  - PDF: Adobe Acroreader

Outline

Concepts

LaTeX Usage

Sample Document

Compiling Process

LaTeX Basics

Compiling Process Revisited

Mathematics: Equations & Formulas

References & Citations

LaTeX References

Classic Books

Tutorials & Introductions

Software & Packages

My Own Practice

Conclusions

# Compiling Process

## Generating PostScript/PDF Files

- Old Way
  1. .tex → .dvi: `latex` sampleDoc-01
  2. .dvi → .ps: `dvips` -o sampleDoc-01.ps sampleDoc-01
  3. .ps → .pdf: `ps2pdf` sampleDoc-01.ps
- New Way
  1. .tex → .pdf: `pdflatex` sampleDoc-01
- Readers & Viewers
  - DVI: xdvi, DVI Viewer, YAP
  - PostScript: Ghostscript + Ghostview
  - PDF: Adobe Acroreader
- Pros and Cons

Outline

Concepts

LaTeX Usage

Sample Document

Compiling Process

LaTeX Basics

Compiling Process Revisited

Mathematics: Equations & Formulas

References & Citations

LaTeX References

Classic Books

Tutorials & Introductions

Software & Packages

My Own Practice

Conclusions

# LaTeX Basics

- LaTeX Comments Start with '%'
- LaTeX Commands Start with '\'
  1. Such as \documentclass, \begin, \end, etc

Outline

Concepts

LaTeX Usage

Sample Document

Compiling Process

LaTeX Basics

Compiling Process Revisited

Mathematics: Equations & Formulas

References & Citations

LaTeX References

Classic Books

Tutorials & Introductions

Software & Packages

My Own Practice

Conclusions

# LaTeX Basics

- LaTeX Comments Start with '%'
- LaTeX Commands Start with '\'
  1. Such as \documentclass, \begin, \end, etc
- Document Structure
  1. Basic/Built-in Classes: **article**, **report**, **book**, & **letter**
  2. Chapters, Sections, Subsections, Subsubsections, etc

# LaTeX Basics: PDF File

## sampleDoc-02.pdf

Outline

Concepts

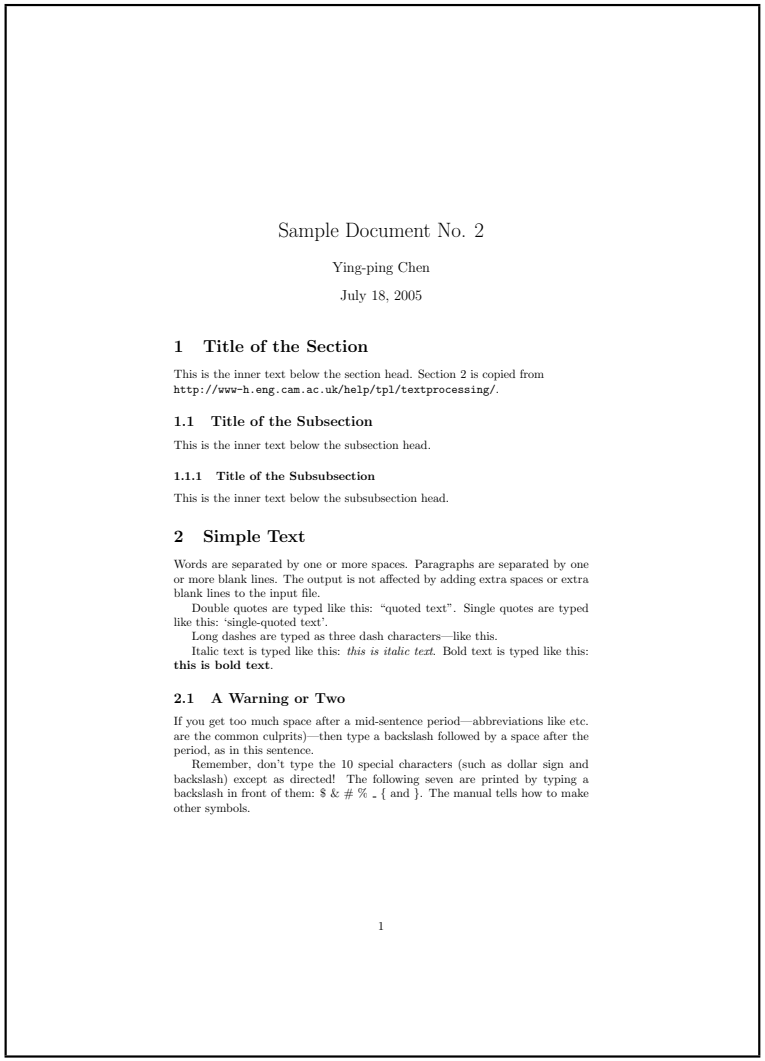
LaTeX Usage

Sample Document
Compiling Process
LaTeX Basics
Compiling Process Revisited
Mathematics: Equations & Formulas
References & Citations

LaTeX References

Classic Books
Tutorials & Introductions
Software & Packages
My Own Practice

Conclusions



Sample Document No. 2

Ying-ping Chen

July 18, 2005

**1 Title of the Section**

This is the inner text below the section head. Section 2 is copied from `http://www-h.eng.cam.ac.uk/help/tpl/textprocessing/`.

**1.1 Title of the Subsection**

This is the inner text below the subsection head.

**1.1.1 Title of the Subsubsection**

This is the inner text below the subsubsection head.

**2 Simple Text**

Words are separated by one or more spaces. Paragraphs are separated by one or more blank lines. The output is not affected by adding extra spaces or extra blank lines to the input file.

Double quotes are typed like this: "quoted text". Single quotes are typed like this: 'single-quoted text'.

Long dashes are typed as three dash characters—like this.

Italic text is typed like this: *this is italic text*. Bold text is typed like this: **this is bold text**.

**2.1 A Warning or Two**

If you get too much space after a mid-sentence period—abbreviations like etc. are the common culprits)—then type a backslash followed by a space after the period, as in this sentence.

Remember, don't type the 10 special characters (such as dollar sign and backslash) except as directed! The following seven are printed by typing a backslash in front of them: $ & # % _ { and }. The manual tells how to make other symbols.

1

Outline

Concepts

LaTeX Usage

Sample Document

Compiling Process

LaTeX Basics

Compiling Process Revisited

Mathematics: Equations & Formulas

References & Citations

LaTeX References

Classic Books

Tutorials & Introductions

Software & Packages

My Own Practice

Conclusions

# Compiling Process Revisited

- Helper & Temporary Files
  1. .log: Log for the Compilation Process
  2. .aux: Auxiliary Information Passed through Iterations
  3. .toc, .lot, .loa, .bbl, .blg, .ind, .idx, ...

Outline

Concepts

LaTeX Usage

Sample Document
Compiling Process
LaTeX Basics
Compiling Process Revisited
Mathematics: Equations & Formulas
References & Citations

LaTeX References

Classic Books
Tutorials & Introductions
Software & Packages
My Own Practice

Conclusions

# Compiling Process Revisited

- Helper & Temporary Files
  1. .log: Log for the Compilation Process
  2. .aux: Auxiliary Information Passed through Iterations
  3. .toc, .lot, .loa, .bbl, .blg, .ind, .idx, ...
- Multiple Iterations Might Be Needed
  1. Forward References in the Same File
  2. Bibliography Items
  3. References in External Files

Outline

Concepts

LaTeX Usage

Sample Document

Compiling Process

LaTeX Basics

Compiling Process Revisited

Mathematics: Equations & Formulas

References & Citations

LaTeX References

Classic Books

Tutorials & Introductions

Software & Packages

My Own Practice

Conclusions

# Compiling Process Revisited

- Helper & Temporary Files
  1. .log: Log for the Compilation Process
  2. .aux: Auxiliary Information Passed through Iterations
  3. .toc, .lot, .loa, .bbl, .blg, .ind, .idx, ...
- Multiple Iterations Might Be Needed
  1. Forward References in the Same File
  2. Bibliography Items
  3. References in External Files
- E.g., sampleDoc-02.tex Needs Two Iterations

# Compiling Process Revisited

## sampleDoc-02.pdf (Only One Iteration)

Outline

Concepts

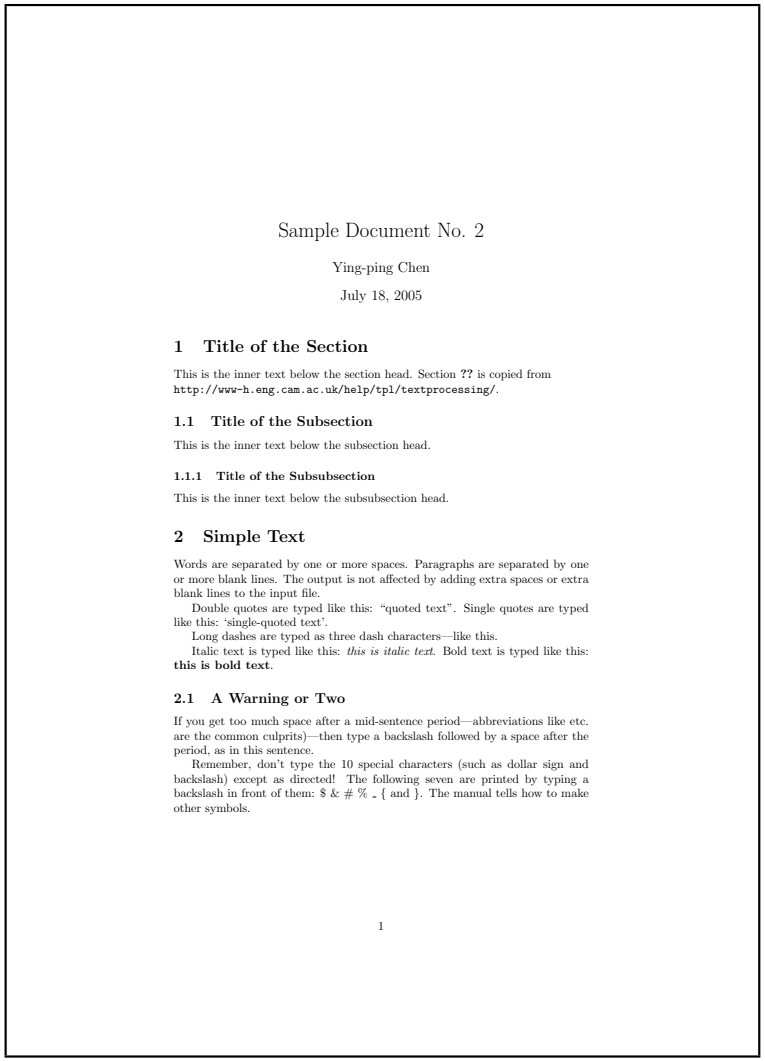
LaTeX Usage

Sample Document
Compiling Process
LaTeX Basics
Compiling Process Revisited
Mathematics: Equations & Formulas
References & Citations

LaTeX References

Classic Books
Tutorials & Introductions
Software & Packages
My Own Practice

Conclusions



Sample Document No. 2

Ying-ping Chen

July 18, 2005

**1 Title of the Section**

This is the inner text below the section head. Section ?? is copied from `http://www-h.eng.cam.ac.uk/help/tpl/textprocessing/`.

**1.1 Title of the Subsection**

This is the inner text below the subsection head.

**1.1.1 Title of the Subsubsection**

This is the inner text below the subsubsection head.

**2 Simple Text**

Words are separated by one or more spaces. Paragraphs are separated by one or more blank lines. The output is not affected by adding extra spaces or extra blank lines to the input file.

Double quotes are typed like this: "quoted text". Single quotes are typed like this: 'single-quoted text'.

Long dashes are typed as three dash characters—like this.

Italic text is typed like this: *this is italic text*. Bold text is typed like this: **this is bold text**.

**2.1 A Warning or Two**

If you get too much space after a mid-sentence period—abbreviations like etc. are the common culprits)—then type a backslash followed by a space after the period, as in this sentence.

Remember, don't type the 10 special characters (such as dollar sign and backslash) except as directed! The following seven are printed by typing a backslash in front of them: $ & # % _ { and }. The manual tells how to make other symbols.

1

Outline

Concepts

LaTeX Usage

Sample Document

Compiling Process

LaTeX Basics

Compiling Process Revisited

Mathematics: Equations & Formulas

References & Citations

LaTeX References

Classic Books

Tutorials & Introductions

Software & Packages

My Own Practice

Conclusions

# Compiling Process Revisited

- Typical Documents w/ Bibliography: Three Iterations

Outline

Concepts

LaTeX Usage

Sample Document
Compiling Process
LaTeX Basics
Compiling Process Revisited
Mathematics: Equations & Formulas
References & Citations

LaTeX References

Classic Books
Tutorials & Introductions
Software & Packages
My Own Practice

Conclusions

# Compiling Process Revisited

- Typical Documents w/ Bibliography: Three Iterations
  1. `latex`: Generate Initial Information

Outline

Concepts

LaTeX Usage

Sample Document
Compiling Process
LaTeX Basics
Compiling Process Revisited
Mathematics: Equations & Formulas
References & Citations

LaTeX References

Classic Books
Tutorials & Introductions
Software & Packages
My Own Practice

Conclusions

# Compiling Process Revisited

- Typical Documents w/ Bibliography: Three Iterations
  1. `latex`: Generate Initial Information
  2. `bibtex`: Get Bibliography Items from the Database

Outline

Concepts

LaTeX Usage

Sample Document
Compiling Process
LaTeX Basics
Compiling Process Revisited
Mathematics: Equations & Formulas
References & Citations

LaTeX References

Classic Books
Tutorials & Introductions
Software & Packages
My Own Practice

Conclusions

# Compiling Process Revisited

- Typical Documents w/ Bibliography: Three Iterations
  1. `latex`: Generate Initial Information
  2. `bibtex`: Get Bibliography Items from the Database
  3. `latex`: Integrate the Bibliography Items

Outline

Concepts

LaTeX Usage

Sample Document
Compiling Process
LaTeX Basics
Compiling Process Revisited
Mathematics: Equations & Formulas
References & Citations

LaTeX References

Classic Books
Tutorials & Introductions
Software & Packages
My Own Practice

Conclusions

# Compiling Process Revisited

- Typical Documents w/ Bibliography: Three Iterations
  1. `latex`: Generate Initial Information
  2. `bibtex`: Get Bibliography Items from the Database
  3. `latex`: Integrate the Bibliography Items
  4. `latex`: Resolve All References

# Compiling Process Revisited

- Typical Documents w/ Bibliography: Three Iterations
  1. `latex`: Generate Initial Information
  2. `bibtex`: Get Bibliography Items from the Database
  3. `latex`: Integrate the Bibliography Items
  4. `latex`: Resolve All References
- No-Brainer Guidelines
  1. Run `latex` to Generate Initial Information
  2. Run All Other Stuff, e.g., `bibtex`, `makeindex`, etc
  3. Run `latex` as Many Iterations as Necessary

Outline

Concepts

LaTeX Usage

Sample Document
Compiling Process
LaTeX Basics
Compiling Process Revisited
Mathematics: Equations & Formulas
References & Citations

LaTeX References

Classic Books
Tutorials & Introductions
Software & Packages
My Own Practice

Conclusions

# Mathematics: Equations & Formulas

- Text Mode vs. Math Mode
  - Text Mode: Default
  - Math Mode: $...$, \[...\], etc

Outline

Concepts

LaTeX Usage

Sample Document

Compiling Process

LaTeX Basics

Compiling Process Revisited

Mathematics: Equations & Formulas

References & Citations

LaTeX References

Classic Books

Tutorials & Introductions

Software & Packages

My Own Practice

Conclusions

# Mathematics: Equations & Formulas

- Text Mode vs. Math Mode
  - Text Mode: Default
  - Math Mode: $...$, \[...\], etc
- Textstyle & Displaystyle: Determined Automatically

Outline

Concepts

LaTeX Usage

Sample Document

Compiling Process

LaTeX Basics

Compiling Process Revisited

Mathematics: Equations & Formulas

References & Citations

LaTeX References

Classic Books

Tutorials & Introductions

Software & Packages

My Own Practice

Conclusions

# Mathematics: Equations & Formulas

- Text Mode vs. Math Mode
  - Text Mode: Default
  - Math Mode: $...$, \[...\], etc
- Textstyle & Displaystyle: Determined Automatically
  - Math Code:

```
\frac{-b \pm \sqrt{b^2-4ac}}{2a}
```

Outline

Concepts

LaTeX Usage

Sample Document

Compiling Process

LaTeX Basics

Compiling Process Revisited

Mathematics: Equations & Formulas

References & Citations

LaTeX References

Classic Books

Tutorials & Introductions

Software & Packages

My Own Practice

Conclusions

# Mathematics: Equations & Formulas

- Text Mode vs. Math Mode
  - Text Mode: Default
  - Math Mode: $...$, \[...\], etc
- Textstyle & Displaystyle: Determined Automatically
  - Math Code:

    ```
    \frac{-b \pm \sqrt{b^2-4ac}}{2a}
    ```

  - Textstyle ($...$): Used in Text like $\frac{-b \pm \sqrt{b^2-4ac}}{2a}$

Outline

Concepts

LaTeX Usage

Sample Document

Compiling Process

LaTeX Basics

Compiling Process Revisited

Mathematics: Equations & Formulas

References & Citations

LaTeX References

Classic Books

Tutorials & Introductions

Software & Packages

My Own Practice

Conclusions

# Mathematics: Equations & Formulas

- Text Mode vs. Math Mode
  - Text Mode: Default
  - Math Mode: $...$, \[...\], etc
- Textstyle & Displaystyle: Determined Automatically
  - Math Code:

    ```
    \frac{-b \pm \sqrt{b^2-4ac}}{2a}
    ```

  - Textstyle ($...$): Used in Text like $\frac{-b \pm \sqrt{b^2-4ac}}{2a}$
  - Displaystyle (\[...\]): Used Separetely like

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Outline

Concepts

LaTeX Usage

Sample Document

Compiling Process

LaTeX Basics

Compiling Process Revisited

Mathematics: Equations & Formulas

References & Citations

LaTeX References

Classic Books

Tutorials & Introductions

Software & Packages

My Own Practice

Conclusions

# Mathematics: Equations & Formulas

- Text Mode vs. Math Mode
  - Text Mode: Default
  - Math Mode: \$...\$, \[...\], etc
- Textstyle & Displaystyle: Determined Automatically
  - Math Code:

    ```
    \frac{-b \pm \sqrt{b^2-4ac}}{2a}
    ```

  - Textstyle (\$...\$): Used in Text like $\frac{-b \pm \sqrt{b^2-4ac}}{2a}$
  - Displaystyle (\[...\]): Used Separetely like

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

  - Use \displaystyle to Enforce: $\displaystyle \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Outline

Concepts

LaTeX Usage

Sample Document

Compiling Process

LaTeX Basics

Compiling Process Revisited

Mathematics: Equations & Formulas

References & Citations

LaTeX References

Classic Books

Tutorials & Introductions

Software & Packages

My Own Practice

Conclusions

# References & Citations

- References
  - \ref{<*some label*>} & \label{<*some label*>}
  - For Sections, Equations, Figures, Tables, etc
  - Use `latex` (Multiple Iterations) to Process

# References & Citations

- References
  - \ref{<*some label*>} & \label{<*some label*>}
  - For Sections, Equations, Figures, Tables, etc
  - Use `latex` (Multiple Iterations) to Process
- Citations
  - \cite{<*citation key*>} & Bibliography Items
  - For Bibliography Citations
  - Use `bibtex` to Process (w/ `latex`)
  - Bibliography Styles: **plain**, **apalike**, **alpha**, etc

Outline

Concepts

LaTeX Usage

Sample Document
Compiling Process
LaTeX Basics
Compiling Process Revisited
Mathematics: Equations & Formulas
References & Citations

LaTeX References

Classic Books
Tutorials & Introductions
Software & Packages
My Own Practice

Conclusions

# LaTeX References

1 Concepts

2 LaTeX Usage

3 LaTeX References
- Classic Books
- Tutorials & Introductions
- Software & Packages
- My Own Practice

4 Conclusions

Outline

Concepts

LaTeX Usage

Sample Document

Compiling Process

LaTeX Basics

Compiling Process Revisited

Mathematics: Equations & Formulas

References & Citations

LaTeX References

Classic Books

Tutorials & Introductions

Software & Packages

My Own Practice

Conclusions

# Classic Books

- LaTeX: A Document Preparation System
  - On Amazon
- The LaTeXCompanion
  - On Amazon

Outline

Concepts

LaTeX Usage

Sample Document
Compiling Process
LaTeX Basics
Compiling Process Revisited
Mathematics: Equations & Formulas
References & Citations

LaTeX References

Classic Books
Tutorials & Introductions
Software & Packages
My Own Practice

Conclusions

# Tutorials & Introductions

## Documents on our Website

- LaTeX $2_\varepsilon$ for Authors
- The Not-So-Short Introduction to LaTeX $2_\varepsilon$
- Tim Love's LaTeX maths and graphics
- BibTeX Guide
- MakeIndex Guide
- LaTeX Command Summary
- The Comprehensive LaTeX Symbol List
- User's Guide for the amsmath Package

Outline

Concepts

LaTeX Usage

Sample Document

Compiling Process

LaTeX Basics

Compiling Process Revisited

Mathematics: Equations & Formulas

References & Citations

LaTeX References

Classic Books

Tutorials & Introductions

Software & Packages

My Own Practice

Conclusions

# Tutorials & Introductions

## Documents on the Internet

- Getting Started with LaTeX
- Online tutorials for LaTeX
- LaTeX Tutorial
- LaTeX – A document preparation system
- TeX Users Group (TUG)
- Comprehensive TeX Archive Network (CTAN)

Outline

Concepts

LaTeX Usage

Sample Document

Compiling Process

LaTeX Basics

Compiling Process Revisited

Mathematics: Equations & Formulas

References & Citations

LaTeX References

Classic Books

Tutorials & Introductions

Software & Packages

My Own Practice

Conclusions

# Software & Packages

## LaTeX Systems & Tools

- LaTeXSystems
  - Linux: Distributed with the System
  - Windows: MiKTeX, LaTeX in cygwin
  - DOS: ...
- Tools
  - Spell Checker: GNU Aspell
  - Drawing Tool: XFIG
  - Plotting Utility: Gnuplot
  - Graph Visualization: ATT Graphviz
  - Image Processing: GNU Image Manipulation Program
  - LaTeX $\rightarrow$ HTML: LaTeX2HTML, HEVEA

Outline

Concepts

LaTeX Usage

Sample Document

Compiling Process

LaTeX Basics

Compiling Process Revisited

Mathematics: Equations & Formulas

References & Citations

LaTeX References

Classic Books

Tutorials & Introductions

Software & Packages

My Own Practice

Conclusions

# Software & Packages

## LaTeX Editors & Integrated Environments

- Editors
  - WinEdt
  - WinTeX XP
  - UltraEdit (General Purpose Editor)
- Integrated Environments
  - LyX
  - TeXnicCenter
  - qbTeX
  - JavaTeX

Outline

Concepts

LaTeX Usage

Sample Document

Compiling Process

LaTeX Basics

Compiling Process Revisited

Mathematics: Equations & Formulas

References & Citations

LaTeX References

Classic Books

Tutorials & Introductions

Software & Packages

My Own Practice

Conclusions

# My Own Practice

## Environments

- On Windows
  - System: LaTeX in cygwin
  - Editing: UltraEdit
  - Viewing: Ghostview & Acrobat Reader
  - Compiling: `make` (General Purpose Utility)
- On Linux
  - System: Built-in LaTeX
  - Editing: joe (on Linux/Unix)
  - Viewing: Ghostview & Acrobat Reader
  - Compiling: `make` (General Purpose Utility)

Outline

Concepts

LaTeX Usage

Sample Document

Compiling Process

LaTeX Basics

Compiling Process Revisited

Mathematics: Equations & Formulas

References & Citations

LaTeX References

Classic Books

Tutorials & Introductions

Software & Packages

My Own Practice

Conclusions

# My Own Practice

## Frequently Used Packages

- `amssymb, amsmath`: American Mathematical Society
- `graphicx`: Extended Graphics Helpers
- `subfigure`: Producing Subfigures
- `algorithmic`: Creating Environments for Algorithms
- `strikeout`: Doing ~~this Effect~~
- `hyperref`: Handling Hyperlinks
- `beamer`: Making Slides (like this Talk)

# Conclusions

- Fundamental Concepts
- LaTeX 101
- LaTeX References
- Let's Start Using LaTeX