

# What is $\text{\LaTeX}$ ?

Dan Yasaki

UNC Greensboro



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$\text{\LaTeX}$  is a document preparation system by Leslie Lamport built upon Donald Knuth's  $\text{\TeX}$  formatting engine. It is widely used in academia to produce documents of high typographical quality.

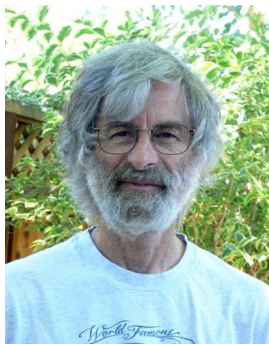


Figure: Knuth (left) and Lamport (right).

# Some Advantages

- $\text{\LaTeX}$  follows the design philosophy of separating presentation from content.
- High quality typesetting.
- Convenient formatting of mathematical formulae.
- Complex structures (footnotes, references, table of contents, links, etc) can be generated easily.
- Encourages structured writing.
- Highly portable and free.

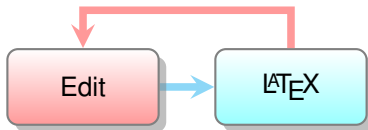


# Some Disadvantages?

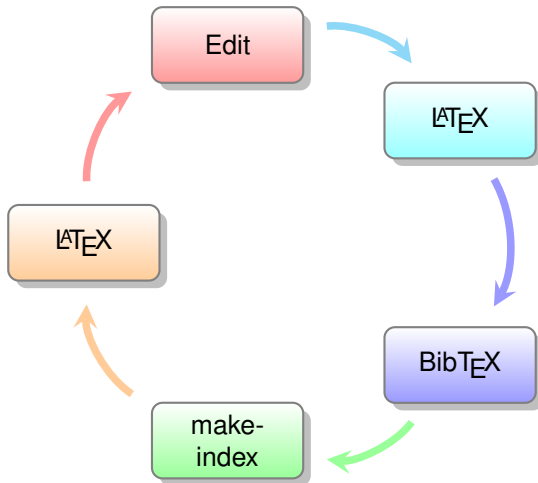
- $\text{\LaTeX}$  follows the design philosophy of separating presentation from content.
- It is very hard to write unstructured and disorganized documents.
- Changes to document layout are tricky.
- Syntax errors.



Plain text file `foo.tex` to `foo.pdf`



# Advanced Workflow



- Getting started with TeX, LaTeX, and friends from the TeX Users Group  
(<http://www.tug.org/begin.html>)
- LaTeX project site  
(<https://www.latex-project.org>)
- This workshop page  
(<https://www.uncg.edu/mat/faculty/yasaki/teaching/latex/>)

- hello.tex
- nonsense.tex
- sample-article.tex
- sample-slides.tex (if time permits)



```
\documentclass{amsart}  
% This is a comment  
\begin{document}  
Hello world.  
\end{document}
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\documentclass{amsart}
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Go to

```
https://www.uncg.edu/mat/faculty/d_yasaki/  
teaching/latex/
```

and download `minimal.tex`. Rename it  
`workshop-article.tex` and move to a workshop folder.



# Inline versus displayed

Use `$` around inline math and `\[... \]` around displayed math.

`$1 + 2 = 2$` versus `\[1 + 2 = 2.\]`

The number of nonisomorphic Galois 2-adic fields with Galois group  $G$  is

$$\frac{1}{\#\text{Aut}(G)} \sum_{H \leq G} \mu_G(H) \alpha(H).$$

The number of nonisomorphic Galois  $2^2$ -adic fields with Galois group  $G$  is

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\[\frac{1}{\#\text{Aut}(G)} \sum_{H \leq G} \mu_G(H) \alpha(H).\]
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# A Syntax Error

NEVER HAVE I FELT SO  
CLOSE TO ANOTHER SOUL  
AND YET SO HELPLESSLY ALONE  
AS WHEN I GOOGLE AN ERROR  
AND THERE'S ONE RESULT  
A THREAD BY SOMEONE  
WITH THE SAME PROBLEM  
AND NO ANSWER  
LAST POSTED TO IN 2003



**Figure:** xkcd: Wisdom of the Ancients (<https://xkcd.com/979/>). All long help threads should have a sticky globally-editable post at the top saying 'DEAR PEOPLE FROM THE FUTURE: Here's what we've figured out so far ...'

You can define your own functions. Add these lines to your preamble.

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\newcommand{\RR}{\mathbb{R}}  
\newcommand{\QQ}{\mathbb{Q}}  
\DeclareMathOperator{\Aut}{Aut}
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# Labels and references

Label and reference. Compile at least twice.

```
\begin{theorem}\label{thm:bob}  
Let  $a$ ,  $b$ , and  $c$  blah.  
\end{theorem}
```

An equation we want to reference:

```
\begin{equation}\label{eq:fancy}  
\sum_{k = 1}^{\infty} k = -\frac{1}{12}.  
\end{equation}
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Theorem~\ref{thm:bob} and  
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Go to MathSciNet:

`http://www.ams.org/mathscinet/`

Retrieve Bib $\TeX$  reference. Save to `references.bib`.  
At end:

```
\bibliographystyle{amsalpha}  
\bibliography{references}
```

In text:

```
\cite{foo} or \cite[Theorem 1.2]{foo}
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$\LaTeX$ , Bib $\TeX$ ,  $\LaTeX$ ,  $\LaTeX$ .

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$$a = 1 + 3 \tag{1}$$

$$c = 4 \tag{2}$$

```
\begin{align}
a &= 1 + 3 \label{eq:eve1} \\
c &= 4 \label{eq:eve2}
\end{align}
```

Use `align*` for no equation numbers.

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In your preamble:

```
\usepackage{graphicx} %for including pictures
```

Figure captions go below. The `[width = 0.5\textwidth]` is optional.

```
\begin{figure}  
\includegraphics[width=0.5\textwidth]{me.jpg}  
\caption{Caption goes here.}\label{fig:selfie}  
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# Tables using `tabular`

You can create tables with `tabular` and `array`. The caption is before the table. The label comes after the caption.

In preamble:

```
\usepackage{booktabs} %for good looking tables.

\begin{table}
\caption{Caption goes here.}\label{tab:han}
\begin{tabular}{clr}
\toprule
centered & left & right\\
\midrule
alice & bob & eve\\
 $x$  &  $y$  &  $z$ \\
\bottomrule
\end{tabular}
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```



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# Tables using array

```
\begin{table}
\caption{Caption goes here.}\label{tab:obiwan}
 $\begin{array}{clr}$ 
\toprule
\text{centered} & \text{left} & \text{right} \\
\midrule
\text{alice} & \text{bob} & \text{eve} \\
x & y & z \\
\bottomrule
\end{array}
\end{table}
```

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x & y & z\\
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Go to:

```
https://mathstats.uncg.edu/sites/yasaki/  
teaching/latex/
```

and download `sample-slides.tex`. Rename it `workshop-slides.tex` and move to workshop folder. Make some slides introducing yourself.



Thank you.

