

Typesetting with $\text{\LaTeX}$

MATH 2610 — Fall 2025

James A. Swenson

8 October 2025

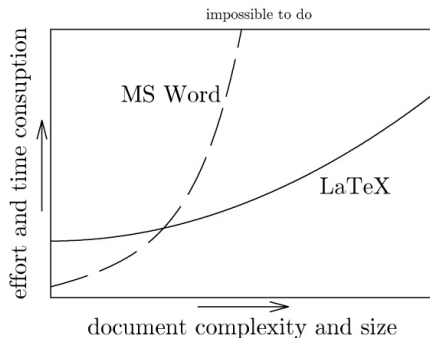
Plan

What is the problem?

What is $\text{T}_{\text{E}}\text{X}$?

Using and learning $\text{\LaTeX}$

Why not use the Microsoft Word Equation Editor?



(Image: Marko Pinteric)

See also “Word Processors: Stupid and Inefficient” by Allin Cottrell [<https://users.wfu.edu/cottrell/wp.html>].

Portrait of the artist

$\text{T}_{\text{E}}\text{X}$ is a typesetting system created by Prof. Donald E. Knuth.



Donald Knuth (1938 –)

(image:  Jacob Appelbaum)

Portrait of the artist

$\text{\TeX}$ is a typesetting system created by Prof. Donald E. Knuth.

- ▶ $\text{\TeX}$ is free software.



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(image:  Jacob Appelbaum)

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T_EX is a typesetting system created by Prof. Donald E. Knuth.

- ▶ T_EX is free software.
- ▶ T_EX is platform-independent.



Donald Knuth (1938 –)

(image:  Jacob Appelbaum)

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$\text{\TeX}$ is a typesetting system created by Prof. Donald E. Knuth.

- ▶ $\text{\TeX}$ is free software.
- ▶ $\text{\TeX}$ is platform-independent.
- ▶ $\text{\TeX}$ is spelled $\tau\epsilon\chi$, as in the Greek word τέχνη “art.”



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- ▶ $\text{\TeX}$ produces beautiful documents!



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- ▶ $\text{T}_{\text{E}}\text{X}$ produces beautiful documents!
- ▶ The current, expanded edition is called $\text{\LaTeX} 2_{\epsilon}$.



Donald Knuth (1938 –)

(image:  Jacob Appelbaum)

Markup language

A $\text{\LaTeX}$ document is not WYSIWYG; you type a plain-text file, and then feed it to the $\text{\LaTeX}$ system to get a PDF document.

For example, to produce:

$$I(\lambda) = \iint_D g(x, y) e^{i\lambda h(x, y)} dx dy$$

one types:

```
\[\boxed{I(\lambda)=\iint_D g(x,y)e^{i\lambda h(x,y)}\,dx\,dy}\]
```

Markup language

A L^AT_EX document is not WYSIWYG; you type a plain-text file, and then feed it to the L^AT_EX system to get a PDF document.

For example, to produce:

$$I(\lambda) = \iint_D g(x, y) e^{i\lambda h(x, y)} dx dy$$

one types:

```
\[\boxed{I(\lambda)=\iint_D g(x,y)e^{i\lambda h(x,y)}\,dx\,dy}\]
```

This presentation was designed using *beamer*, a *package* that adds functionality to L^AT_EX. The L^AT_EX file that produced these slides is on my [website](#). I filled it with comments to explain how it works!

Another example

The equation $\frac{\partial(x,y)}{\partial(u,v)} = \left| \begin{array}{cc} \frac{\partial x}{\partial u} & \frac{\partial x}{\partial v} \\ \frac{\partial y}{\partial u} & \frac{\partial y}{\partial v} \end{array} \right|$ was produced by typing:

```
\newcommand{\pd}[2]{\frac{\partial#1}{\partial#2}}
\left(
  \pd{(x,y)}{(u,v)}=
  \left|
    \begin{array}{cc}
      \pd{xu} & \pd{xv} \\
      \pd{yu} & \pd{yv}
    \end{array}
  \right|
\right)
```

Other $\text{\LaTeX}$ commands

You can make a whole variety of lovely symbols easily in $\text{\LaTeX}$:

<code>\in</code>	$\in$	<code>\ge</code>	$\geq$
<code>\infty</code>	∞	<code>\not\subseteq</code>	$\not\subseteq$
<code>\pi</code>	π	<code>\xi</code>	ξ
<code>\forall</code>	$\forall$	<code>\otimes</code>	$\otimes$
<code>\mathbb{Z}</code>	$\mathbb{Z}$	<code>\aleph_0</code>	$\aleph_0$
<code>\NoIroning</code>		<code>\Coffeecup</code>	
<code>\Capricorn</code>	$\text{\textcircled{♈}}$	<code>\Smiley</code>	$\text{\textcircled{😊}}$

You can find the 481-page “Comprehensive $\text{\LaTeX}$ Symbol List” at:
[\[https://ctan.math.illinois.edu/info/symbols/comprehensive/symbols-letter.pdf\]](https://ctan.math.illinois.edu/info/symbols/comprehensive/symbols-letter.pdf)

Find that command!

What command makes the symbol $\oint$?

1. If there's an easy way to describe the symbol, Google it.

latex double integral closed surface

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 TeX - LaTeX Stack Exchange
<https://tex.stackexchange.com/questions/100000/xelatex-double-closed-path-integral>

XeLaTeX Double closed path integral? [duplicate]

Feb 27, 2014 – The symbol you're looking for is called `\oint`, but you need either `esint` or `unicode-math` for accessing it.

2 answers · Top answer: The symbol you're looking for is called `\oint`, but you need either `esint` or `unico...`

surface integral - TeX - LaTeX Stack Exchange 2 answers Sep 21, 2013

double integral over oriented closed surface - TeX 1 answer Dec 11, 2015

[More results from tex.stackexchange.com](#)

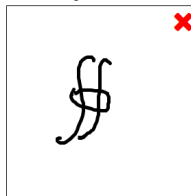
Find that command!

What command makes the symbol $\mathfrak{f}$?

1. If there's an easy way to describe the symbol, Google it.
2. Draw it at [Detexify](#).

Detexify

classify symbols



Want a Mac app?

Lucky you. The Mac app is finally stable enough. See how it works on [Vimeo](#). Download the latest version [here](#).

	Score: 0.12853070394455013 <code>\usepackage{ esint }</code> <code>\varoint</code> mathmode
	Score: 0.13969656324602686 <code>\usepackage{ esint }</code> <code>\sqint</code> mathmode
	Score: 0.15005133735166087 <code>\usepackage{ esint }</code> <code>\oint</code> mathmode
	Score: 0.20800610003397518 <code>\Downarrow</code> mathmode

Find that command!

What command makes the symbol $\mathfrak{ff}$?

1. If there's an easy way to describe the symbol, Google it.
2. Draw it at [Detexify](#).
3. Ask someone!



Find that command!

What command makes the symbol $\oint$?

1. If there's an easy way to describe the symbol, Google it.
2. Draw it at [Detexify](#).
3. Ask someone!
4. Hunt it down in the Comprehensive Symbol List.

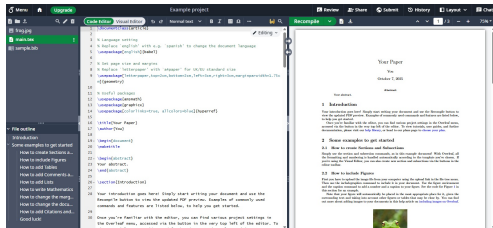
TABLE 85: esint Variable-sized Math Operators

$\int \cdots \int$	$\int \cdots \int$	<code>\dotsint</code>	$\oint$	$\oint$	<code>\ointclockwise</code>
$\int$	$\int$	<code>\fint</code>	$\oint$	$\oint$	<code>\ointctrlockwise</code>
$\iiint$	$\iiint$	<code>\iiiint</code>	$\oiint$	$\oiint$	<code>\sqiint</code>
$\iiint$	$\iiint$	<code>\iiint</code>	$\oiint$	$\oiint$	<code>\sqint</code>
$\iint$	$\iint$	<code>\iint</code>	$\varoiint$	$\varoiint$	<code>\varoiint</code>
$\int$	$\int$	<code>\landdowntoint</code>	$\oint$	$\oint$	<code>\varointclockwise</code>
$\int$	$\int$	<code>\landupoint</code>	$\oint$	$\oint$	<code>\varointctrlockwise</code>
$\oiint$	$\oiint$	<code>\oiint</code>			

What is the problem?
What is T_EX?
Using and learning L^AT_EX

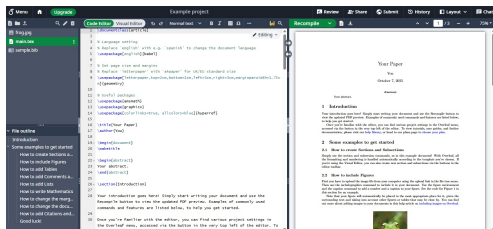
How do I get L^AT_EX?

Start by using Overleaf, at [<https://www.overleaf.com/>]. It works in your web browser, so there's nothing to install.



How do I get $\text{\LaTeX}$?

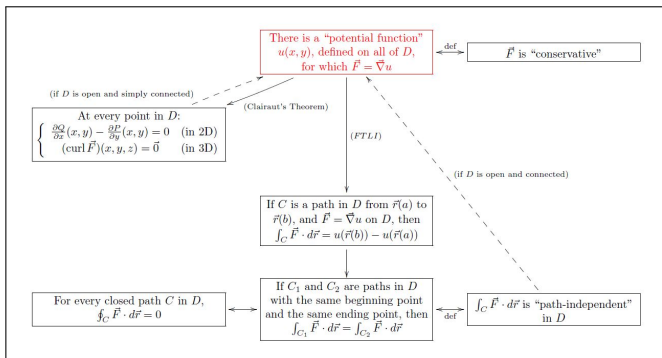
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If you become a $\text{\LaTeX}$ fanatic, you can upgrade to installing your own system, customizing your text editor, creating your own commands, writing your own packages. . . .

Have fun using $\text{\LaTeX}$!

Steal what you need from the source file of this presentation! If you need to know how to type something in $\text{\LaTeX}$, you can certainly find out with Google. You could also ask me for advice!



Time to experiment!



A Digital Science Solution

New project

Blank project

Example project

Upload project

Import from GitHub

Challenges

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	$\int_a^b F'(x) dx = F(b) - F(a)$
$\sum_{k=1}^{\infty} \frac{1}{k^6} = \frac{\pi^6}{945}$	$\log(re^{i\theta}) = \ln r + i(\theta + 2\pi n)$
$\sum_{i=r}^n \binom{i}{r} = \binom{n+1}{r+1}$	$\oint_{\partial D} \vec{F} \cdot d\vec{r} = \iint_D \left(\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y} \right) dA$
$\frac{1}{\sqrt{2\pi\sigma^2}} e^{-\left(\frac{x-\mu}{\sigma}\right)^2/2}$	$\lim_{x \rightarrow a} \frac{f(x)}{g(x)} \stackrel{\left(\frac{0}{0}\right)}{=} \lim_{x \rightarrow a} \frac{f'(x)}{g'(x)}$
$\mathbb{C} \cong \left\{ \begin{pmatrix} a & -b \\ b & a \end{pmatrix} : a, b \in \mathbb{R} \right\}$	$X \setminus \left(\bigcup_{A \in \mathcal{S}} A \right) = \bigcap_{A \in \mathcal{S}} (X \setminus A)$