An Introduction to LaTeX

Make Documents Like A PROgrammer

Wesley T. Honeycutt

University of Oklahoma

October 11, 2018

[0] https://github.com/BlueNalgene/Introduction_to_LaTeX

History

- In 1978, Donald Knuth created the TEX programming language in a fit of frustration with how ugly photoprinting looked.

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- In 1983, Leslie Lamport released LATEX (Layman's TEX), a set of macros which made TEX usable by mortals.
- There are many other variants such as :

BIBTEX ConTEXt LuaTEX LYX pdfLATEX XƎLATEX

LaTeX is. . .

. . . a sophisticated document preparation sytem.

LaTeX has. . .

- Stylistic uniformity
- Bibliography support
- Sophisticated structuring abilities
- Reference tracking
- Highly extendible capabilities

LaTeX is not...

...a word processor.

LaTeX does not...

- Spell-check your documents
- Give you complete control over formatting
- Provide a graphical interface for editing

"You take care of writing, and we'll take care of presentation."

You might be used to WYSIWYG

What
Y ou
S ee
I s
What
Y ou
G et

LaTeXis WYSIWYM

What
Y ou
S ee
I s
What
Y ou
Mean

Presentation matching what you wrote, not how it was written

This text is spaced specially.

```
1 This    text is
2 spaced     specially.
```

Paragraphs are easy.
Use double line breaks.

```
1 Paragraphs are easy.
2
3 Use double line breaks.
```

Never break the unbreakable unless you want to.
You can force connections of words in a line or force spaces and
linebreaks.

```
1 Never break the unbreakable
      unless you want to.
2
3 You~can~force~connections~of~
      words~in~a~line~or\ force
      \ spaces and\\linebreaks.
```

If you like to suffer

LaTeXis coded as plaintext. If you really want to, you can do everything in a Notepad-like text editor.

The code is processed via command line:

```
pdflatex thefile.tex
```

There are add-ons for popular text editors

- *vim*: LaTeXsuite for vim

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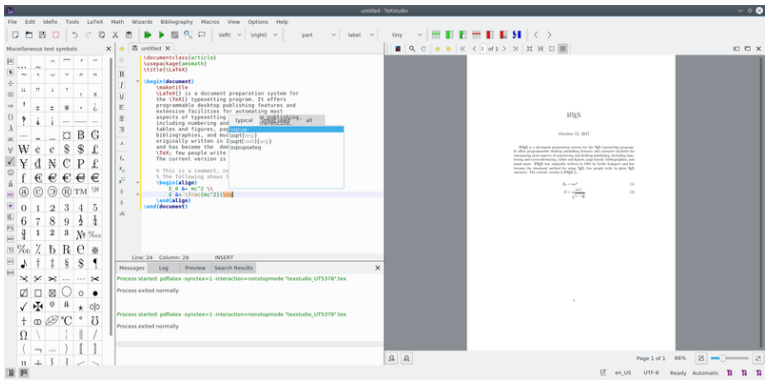
- *Sublime Text*: LaTeXTools
- *Atom*: LaTeXapm

Lots of LaTeX IDE's

- TeXstudio



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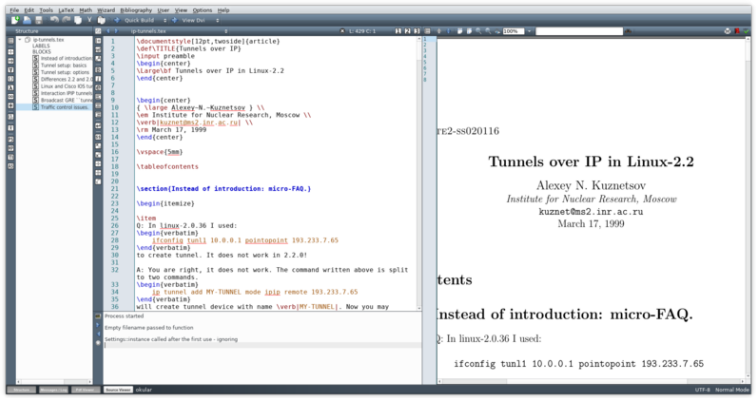
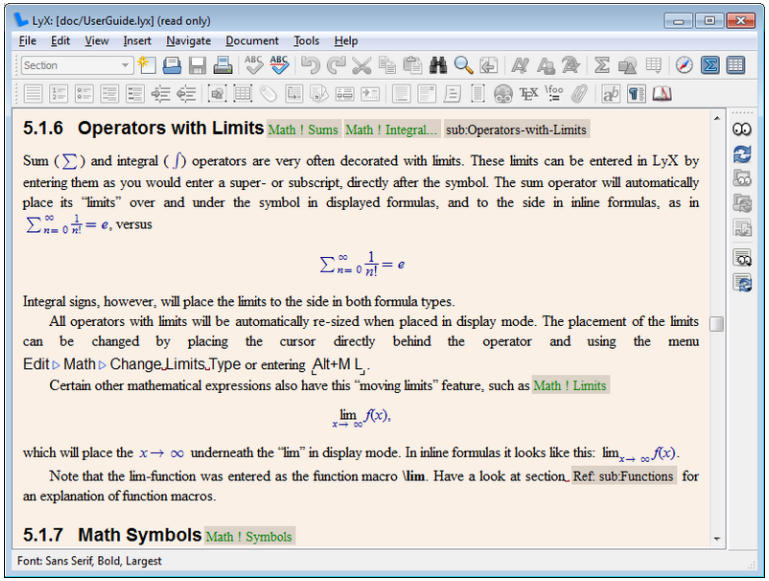
- TeXstudio
- Texmaker



Lots of LaTeX IDE's

- TeXstudio
- Texmaker
- LyX



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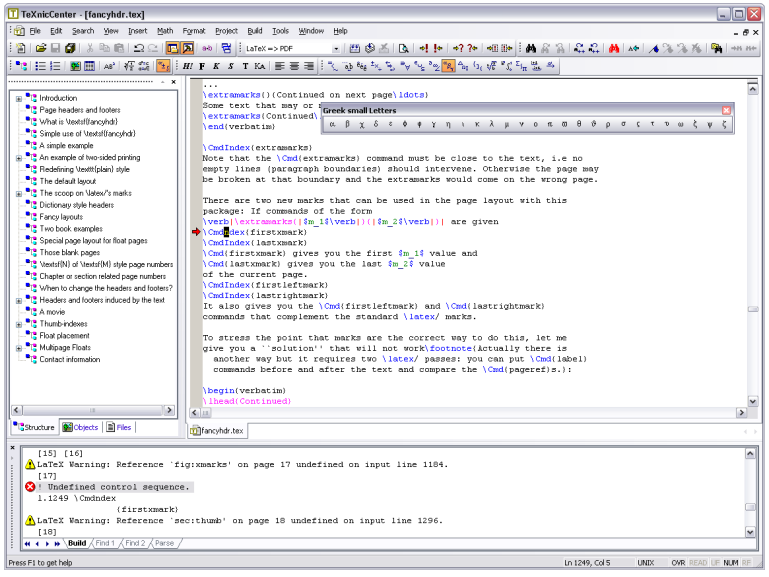
- Texmaker
- LyX
- MacTeX
- MiKTeX



Lots of LaTeX IDE's

- TeXstudio
- Texmaker
- LyX
- MacTeX
- MiKTeX
- TeX Live

Online collaborative options

- Overleaf/ShareLaTeX

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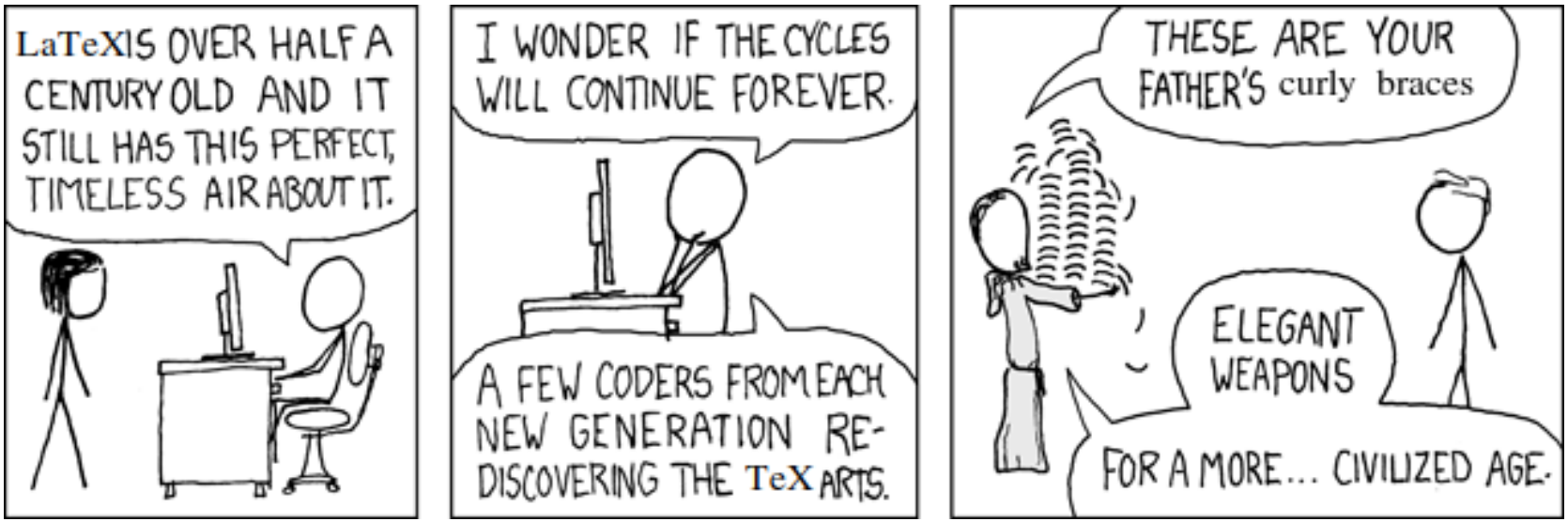
- Authorea

Online collaborative options

- Overleaf/ShareLaTeX
- Authorea
- There are others which I have no experience with.

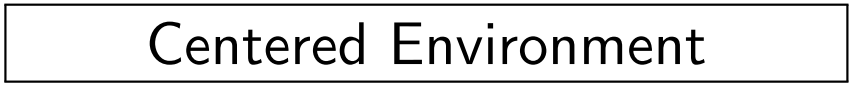
Learn to love braces



[0]With apologies to Randall Munroe

Commands and Environments


```
1 Uncentered
```




```
1 \begin{center}
2   Centered Environment
3 \end{center}
```


```
1 \centering
2 Command Centered
```

The Logical Structure of a LaTeX Document

Preamble

- Declare the document type you will be making:
  \documentclass[options]{class}

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  \documentclass[options]{class}
- Declare what packages you will need:
  \usepackage[options]{package}

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- Define any custom functions or environments

The Logical Structure of a LaTeX Document

Preamble

- Declare the document type you will be making: \documentclass[options]{class}
- Declare what packages you will need: \usepackage[options]{package}
- Define any custom functions or environments
- Declare important variables

The Logical Structure of a LaTeX Document cont'd

Body

- Initialize the document in an environment

```
\begin{document}
    ...
\end{document}
```

The Logical Structure of a LaTeX Document cont'd

Body

- Initialize the document in an environment
  \begin{document}
  ...
  \end{document}
- Within this environment you will:

The Logical Structure of a LaTeX Document cont'd

Body

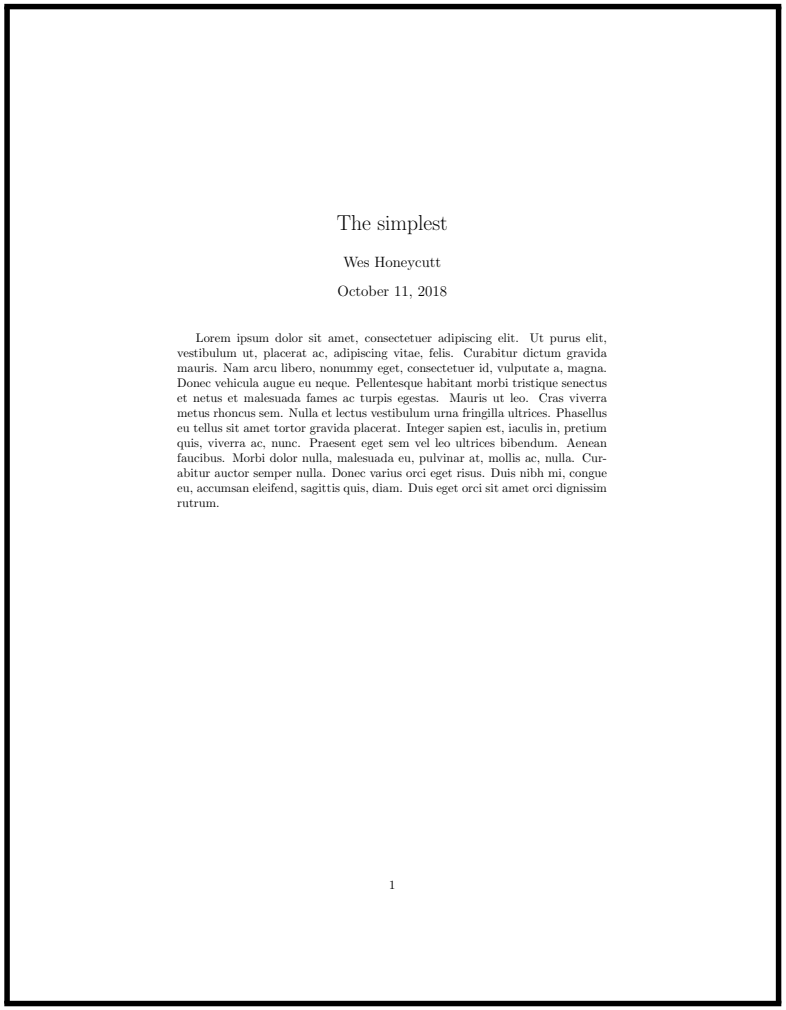
- Initialize the document in an environment
  \begin{document}
  ...
  \end{document}
- Within this environment you will:
  - Create the title page or section:
    \maketitle

The Logical Structure of a LaTeX Document cont'd

Body

- Initialize the document in an environment
  \begin{document}
  ...
  \end{document}
- Within this environment you will:
  - Create the title page or section:
    \maketitle
  - Write your document

The simplest document



The simplest

Wes Honeycutt

October 11, 2018

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

1

```
\documentclass{article}
\usepackage{lipsum}
\title{The simplest}
\author{Wes Honeycutt}
\begin{document}
  \maketitle
  \lipsum[1]
\end{document}
```

Making the \maketitle

The title can include several elements, which are declared by the user.

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- \title{The Title}

Making the \maketitle

The title can include several elements, which are declared by the user.

- \title{The Title}
- \author{The Author's Name}

Making the \maketitle

The title can include several elements, which are declared by the user.

- \title{The Title}
- \author{The Author's Name}
  - This can include \thanks{Some Institution}

Making the \maketitle

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- \title{The Title}
- \author{The Author's Name}
  - This can include \thanks{Some Institution}
- \subtitle{A Clever Subtitle}

Making the \maketitle

The title can include several elements, which are declared by the user.

- \title{The Title}
- \author{The Author's Name}
  - This can include \thanks{Some Institution}
- \subtitle{A Clever Subtitle}
- \subject{A Subject Heading}

Our Sample Title Page

```
\title{The Pitfalls of LaTeX}

\author{
  Wesley T. Honeycutt
  \thanks{University of Oklahoma Department of Biology}
  \and Leon the Cat}

\subtitle{Stackexchange was down and other horror stories}

\subject{A Joke Paper}
```

\documentclass{article}

The Pitfalls of LaTeX

Wesley T. Honeycutt * Leon the Cat

October 11, 2018

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

*University of Oklahoma Department of Biology

\documentclass{scrbook}

A Joke Paper

The Pitfalls of LaTeX

Stack Exchange was down and other horror stories

Wesley T. Honeycutt * Leon the Cat

October 11, 2018

*University of Oklahoma Department of Biology

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

\documentclass{report}

Stack Exchange was down and other horror stories A Joke Paper

The Pitfalls of LaTeX

Wesley T. Honeycutt [1] Leon the Cat

October 11, 2018

[1]University of Oklahoma Department of Biology

\documentclass{elsarticle}

The Pitfalls of LaTeX

Wesley T. Honeycutt [1]

Leon the Cat Lorem ipsum dolor

sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Publisher Distributed Classes

The previous example shows how different classes rearrange the same elements.

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Academic Publishers

Elsevier - `elsarticle`

Springer - `llncs`

IEEE - `IEEEtran`

AMS - `amscls`

ACS - `achemso`

Some More Academic Publishers With Classes

- aaai www.aaai.org
- AAAS/science www.sciencemag.org
- American Chemical Society Publications
- Addison-Wesley
- algebra universalis
- American Institute of Physics www.aip.org
- American Meteorological Society www.ametsoc.org
- American Physical Society authors.aps.org
- Beech Stave Press
- Birkhuser
- Cambridge University Press
- CRC
- Documenta Mathematica www.math.uiuc.edu
- Docscape
- Engine House Books

Some More Academic Publishers With Classes

- Fondo de Cultura Econmica
- Informs joc.pubs.informs.org
- Institut Mittag-Leffler (Royal Swedish Academy of Sciences)
- www.arkivformatematik.org
- IOP (institute of physics) authors.iop.org
- John Benjamins Publishing Company
- London Mathematical Society books www.lms.ac.uk
- Louisiana State University Press
- Mathematical Association of America www.maa.org
- National Research Council of Canada
- Oxford University Press www.oup.co.uk
- Princeton University Press press.princeton.edu
- Publications de l'Institut Mathmatique (Beograd) www.emis.de

Some More Academic Publishers With Classes

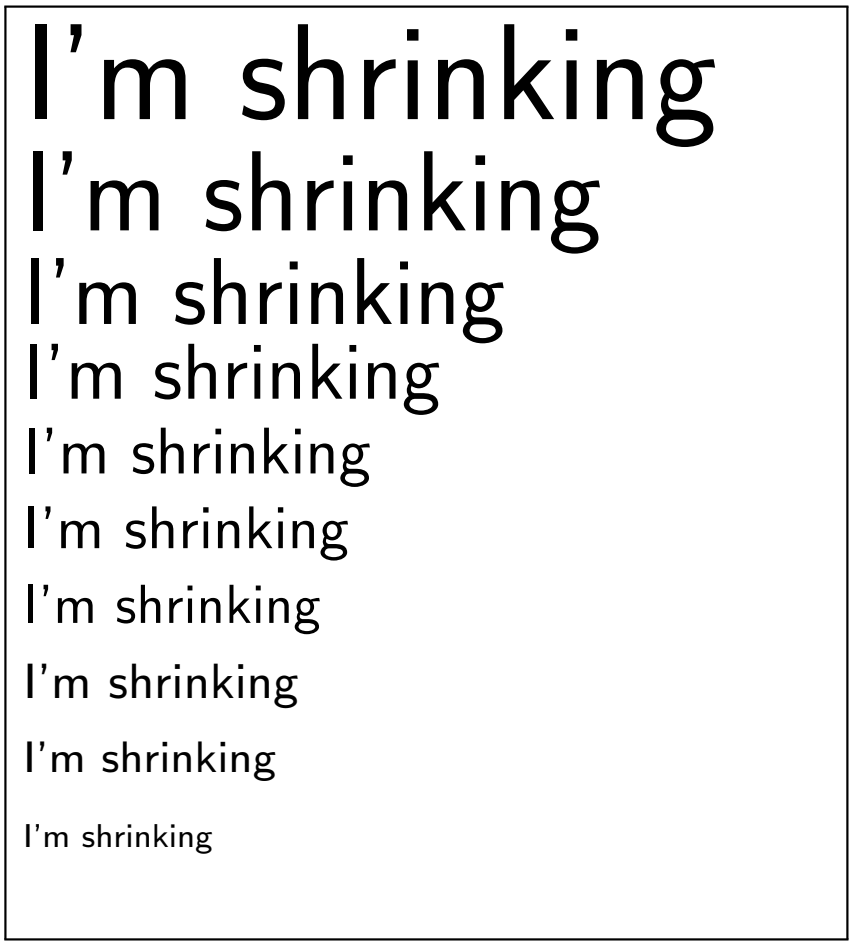
- SAS Institute
- SIAM books www.siam.org
- Springer math www.springer.com
- Springer physics www.springer.com
- Thomson Delmar Learning
- UIT Cambridge
- Unipress (Institute of High Pressure Physics, Polish Academy of Sciences)
- www.unipress.waw.pl
- University of California Press
- Wiley www.wiley.com
- William Andrew Publishing
- World Scientific
- WordTech

Text Formats

Be **Bold**!
Italicize!
Underline to accentuate!
Write with *emphasis*!

```
1  Be \textbf{Bold}!\\
2  \textit{Italicize}!\\
3  \underline{Underline} to
       accentuate!\\
4  Write with \emph{emphasis}!\\
```

Font Size




```
1  {\Huge I'm shrinking}\\
2  {\huge I'm shrinking}\\
3  {\LARGE I'm shrinking}\\
4  {\Large I'm shrinking}\\
5  {\large I'm shrinking}\\
6  {\normalsize I'm shrinking}\\
7  {\small I'm shrinking}\\
8  {\footnotesize I'm shrinking
       }\\
9  {\scriptsize I'm shrinking}\\
10 {\tiny I'm shrinking}\\
```

Section Hierarchy

```
\section{The Topmost}
    \subsection{A Little Deeper}
        \subsubsection{Deeper Still}
                                                    ...
```

Lists

- Boomer
- Sooner
- Oklahoma

```
\begin{itemize}
  \item Boomer
  \item Sooner
  \item Oklahoma
\end{itemize}
```

1. Boomer
2. Sooner
3. Oklahoma

```
\begin{enumerate}
  \item Boomer
  \item Sooner
  \item Oklahoma
\end{enumerate}
```

Nested Lists

- Boomer
  - Sooner
- Oklahoma

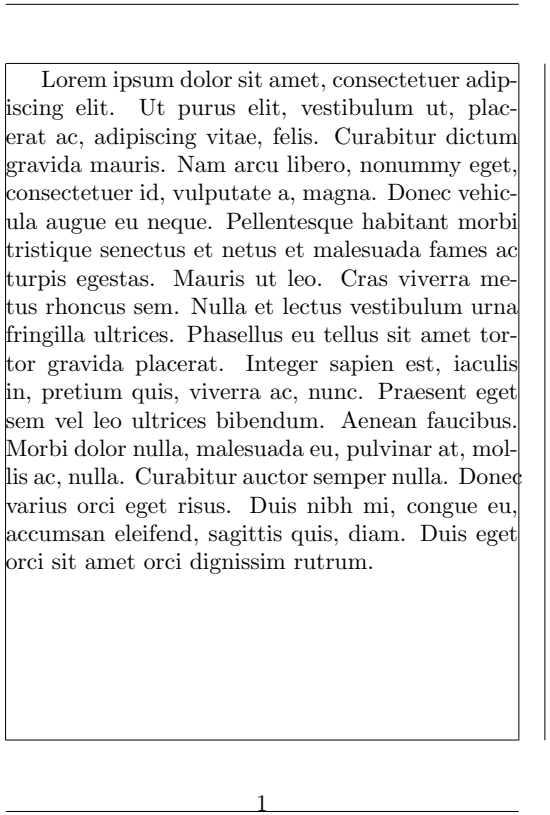
```
\begin{itemize}
  \item Boomer
  \begin{itemize}
    \item Sooner
  \end{itemize}
  \item Oklahoma
\end{itemize}
```

1. Boomer
   1.1 Sooner
2. Oklahoma

```
\begin{enumerate}
  \item Boomer
  \begin{enumerate}
    \item Sooner
  \end{enumerate}
  \item Oklahoma
\end{enumerate}
```

Exotic Page Sizes

You can alter the \geometry of a page.




```
\documentclass{article}
\usepackage{lipsum}
\usepackage[paperheight=5in,
  paperwidth=4in,
  margin=0.5in,
  heightrounded,
  showframe]{geometry}
\begin{document}
  \lipsum[1]
\end{document}
```

Graphics

Graphics are included with size information, but not location.

```
1  \includegraphics[width=0.75\
       linewidth]{leonbike.png}
```

They still need somewhere to go!

Graphics Locations

You can put graphics within containers.

-  My cat's name is Leon
-  He is a handsome little man
-  Also a jerk

```
\documentclass{article}
\usepackage[paperheight=2
    in,paperwidth=2in,
    margin=0in]{geometry}
\usepackage{graphicx}
\newcommand*{\meow}{\
    includegraphics[width
    =1em]{leon.png}}
\begin{document}
  \begin{itemize}
    \item[\meow] My cat's
         name is Leon
    \item[\meow] He is a
        handsome little
        man
    \item[\meow] Also a
        jerk
  \end{itemize}
\end{document}
```

Floats

Floats hold things for you.

- h - Put it about *here*

Floats

Floats hold things for you.

- h - Put it about *here*
- t - Put it on the *top* of a page

Floats

Floats hold things for you.

- h - Put it about *here*
- t - Put it on the *top* of a page
- b - Put it on the *bottom* of a page

Floats

Floats hold things for you.

- h - Put it about *here*
- t - Put it on the *top* of a page
- b - Put it on the *bottom* of a page
- p - Put it on a dedicated *page*

Floats

Floats hold things for you.

- h - Put it about *here*
- t - Put it on the *top* of a page
- b - Put it on the *bottom* of a page
- p - Put it on a dedicated *page*
- ! - Listen to me you little...

Floats

Floats hold things for you.

- h - Put it about *here*
- t - Put it on the *top* of a page
- b - Put it on the *bottom* of a page
- p - Put it on a dedicated *page*
- ! - Listen to me you little...

Feel free to mix and match.

Floats

Floats hold things for you.

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- t - Put it on the *top* of a page
- b - Put it on the *bottom* of a page
- p - Put it on a dedicated *page*
- ! - Listen to me you little...

Feel free to mix and match.

- tb - Put it on the top or bottom of the page, whatever works

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- ! - Listen to me you little...

Feel free to mix and match.

- tb - Put it on the top or bottom of the page, whatever works
- $htbp$ - I don't care where you put it

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Feel free to mix and match.

- tb - Put it on the top or bottom of the page, whatever works
- $htbp$ - I don't care where you put it
- $h!$ - If you don't put it here I swear to Papa Knuth I will `apt remove` you

Tables

Tables are made within the `tabular` float environment.

	col1	col2	col3
row1	a	b	c
row2	aa	bb	cc
row3	aaa	bbb	ccc

```
\begin{tabular}[htbp]{l|c|c|c
    }
  ~    & col1 & col2 & col3\\
       \hline
  row1 & a    & b    & c \\
  row2 & aa   & bb   & cc \\
  row3 & aaa  & bbb  & ccc \\
\end{tabular}
```

These can be as complicated as you want to make them.

III–V Compounds		Group III				
		5 B	13 Al	31 Ga	69 In	81 Tl
Group V	7 N	BN	AlN	GaN (3.4)	InN	TlN
	15 P	BP	AlP (2.55)	GaP (2.24)	InP (1.27)	TlP
	33 As	BAs	AlAs	GaAs (1.35)	InAs	TlAs
	51 Sb	BSb	AlSb	GaSb (9.67)	InSb	TlSb
	84 Bi	BBi	AlBi	GaBi	InBi	TlBi
Atomic number in black above element				Energy band gap (eV) of some of the selected elements within bracket		

Math

$$x^2 + y^2 = z^2 \tag{1}$$

```
\begin{equation}
  x^2 + y^2 = z^2
\end{equation}
```

$$\frac{\hbar^2}{2m}\nabla^2\Psi + V(\mathbf{r})\Psi = -i\hbar\frac{\partial\Psi}{\partial t} \tag{2}$$

```
\begin{equation}
  \frac{\hbar^2}{2m}\nabla^2\
       Psi + V(\mathbf{r})\Psi
        = -i\hbar \frac{\
       partial\Psi}{\partial t
       }
\end{equation}
```

Inline $y = m * x + b$ equations.

```
Inline $y = m*x+b$ equations.
```

Aligned math

$$
\begin{aligned}
0 &= ax^2 + bx + c \\
0 &= x^2 + \frac{b}{a}x + \frac{c}{a} \\
0 &= x^2 + \frac{b}{a}x + \frac{b^2}{4a^2} + \frac{c}{a} - \frac{b^2}{4a^2} \\
\frac{b^2}{4a^2} - \frac{c}{a} &= \left(x + \frac{b}{2a}\right)^2 \\
\frac{b^2 - 4ac}{4a^2} &= \left(x + \frac{b}{2a}\right)^2 \\
\frac{\pm\sqrt{b^2 - 4ac}}{2a} &= x + \frac{b}{2a} \\
\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} &= x
\end{aligned}
$$

Citing and Referencing

- LaTeXcan create perfect bibliographies with BibTeX

Citing and Referencing

- LaTeXcan create perfect bibliographies with BibTeX
- BibTeX files are sets of information which contain everything relevant to citing a source

Citing and Referencing

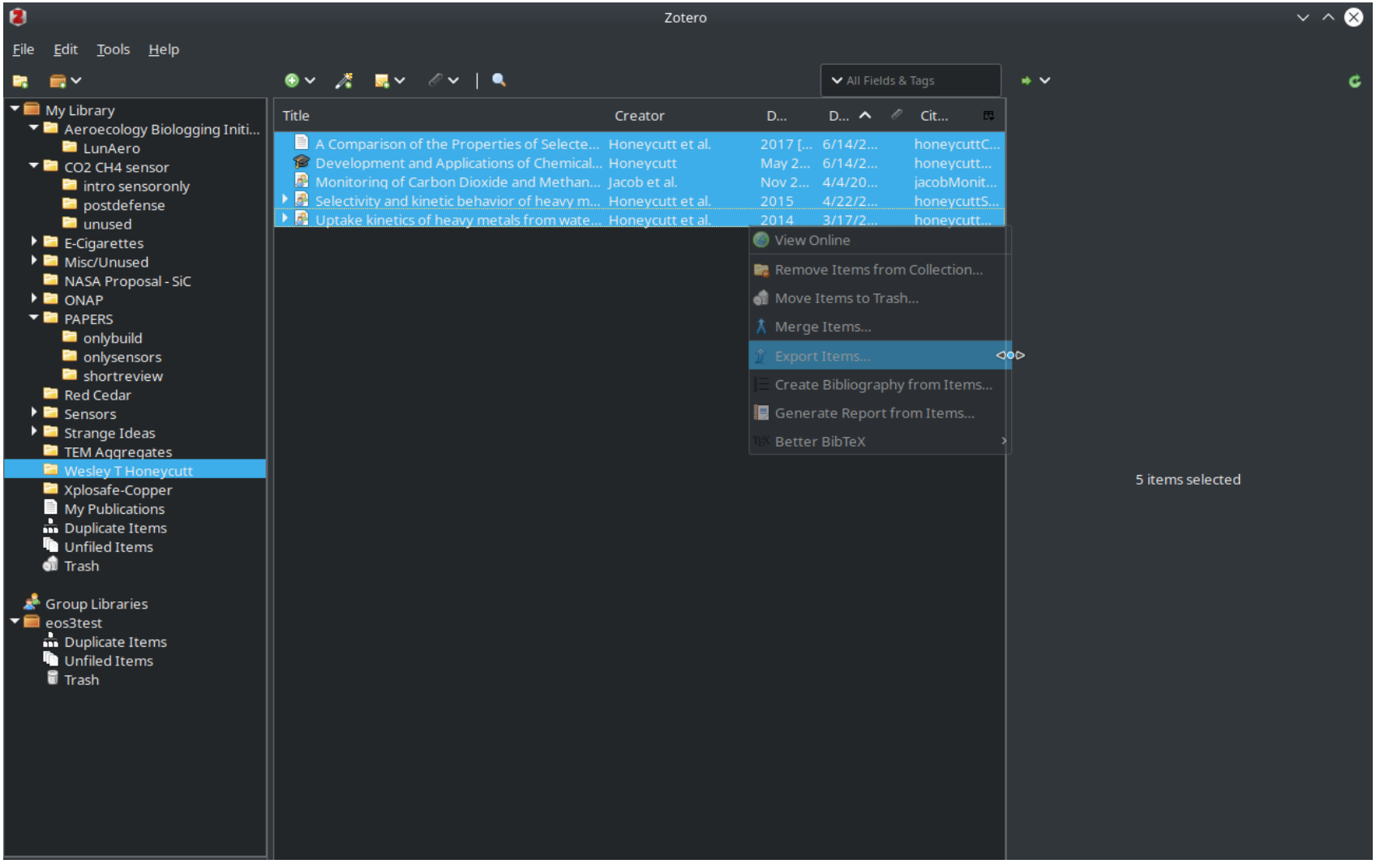
- LaTeXcan create perfect bibliographies with BibTeX
- BibTeX files are sets of information which contain everything relevant to citing a source
- Most citation managers can export BibTeX files

A BibTeX Entry

```
@inproceedings{jacob2016,
series = {20},
title = {Monitoring of {{Carbon Dioxide}} and {{Methane
    Plumes}} from {{Combined Ground}}-{{Airborne Sensors}}},
volume = {61},
booktitle = {Convection and {{Boyancy Driven Flows}}: {{
    Environmental}}},
publisher = {{APS}},
author = {Jacob, Jamey and Mitchell, Taylor and Honeycutt,
    Wesley T. and Materer, Nicholas F. and Clark, Peter},
month = nov,
year = {2016}
}

@phdthesis{dissertation,
address = {Stillwater, Oklahoma},
type = {Dissertation},
title = {Development and {{Applications}} of {{Chemical
    Sensors}} for the {{Detection}} of {{Atmospheric Carbon
    Dioxide}} and {{Methane}}},
school = {Oklahoma State University},
author = {Honeycutt, Wesley T.},
month = may,
year = {2017}
}
```

I like using Zotero



Now I can easily cite a source.

Not only does the illustrious Dr. Honeycutt have a PhD in chemistry [1], but he likes to give technical talks [2, 3]. Other people even like giving presentations on his work [4]!

```
Not only does the
    illustrious Dr.
    Honeycutt have a PhD in
    chemistry~\cite{
    dissertation}, but he
    likes to give technical
    talks~\cite{talk2014,
    talk2015}.  Other people
     even like giving
    presentations on his
    work~\cite{jacob2016}!
```

Then we create our bibliography

```
\bibliographystyle{natbib}
\bibliography{bib}
```

References

[1] Wesley T. Honeycutt. *Development and Applications of Chemical Sensors for the Detection of Atmospheric Carbon Dioxide and Methane*. Dissertation, Oklahoma State University, Stillwater, Oklahoma, May 2017.

[2] Wesley T. Honeycutt, Hayden Hamby, Allen Apblett, and Nicholas F. Materer. Uptake kinetics of heavy metals from water using a high surface area supported inorganic metal oxide. In *Abstracts of Papers, 247th ACS National Meeting & Exposition, Dallas, TX, United States, March 16-20, 2014*, pages ENVR–272. American Chemical Society, 2014. Copyright (C) 2015 American Chemical Society (ACS). All Rights Reserved.

[3] Wesley T. Honeycutt, Evgueni B. Kadossov, Allen W. Apblett, and Nicholas F. Materer. Selectivity and kinetic behavior of heavy metal and radionuclides on supported ion-exchange adsorbant. In *Abstracts of Papers, 249th ACS National Meeting & Exposition, Denver, CO, United States, March 22-26, 2015*, pages I+EC–44. American Chemical Society, 2015. Copyright (C) 2016 American Chemical Society (ACS). All Rights Reserved.

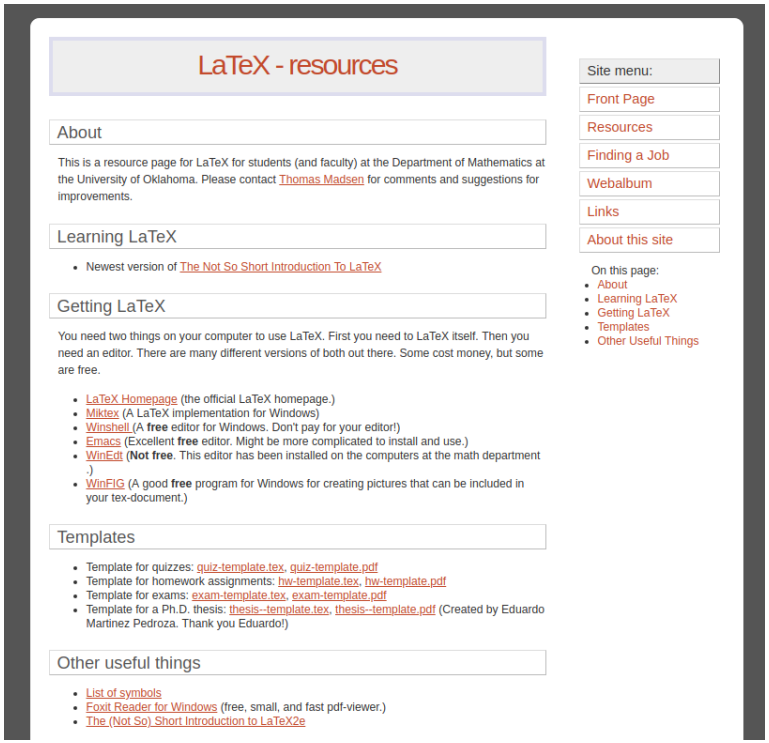
[4] Jamey Jacob, Taylor Mitchell, Wesley T. Honeycutt, Nicholas F. Materer, and Peter Clark. Monitoring of Carbon Dioxide and Methane Plumes from Combined Ground-Airborne Sensors. In *Convection and Boyancy Driven Flows: Environmental*, volume 61 of *20*. APS, November 2016.

Super Powerful for Theses

Pop a chapter out,
boom. . . you got a paper.

My last school didn't have a template. So I had to make one myself.

But you are lucky! The OU math department has one.



LaTeX - resources

Site menu:
- Front Page
- Resources
- Finding a Job
- Webalbum
- Links
- About this site

On this page:
- About
- Learning LaTeX
- Getting LaTeX
- Templates
- Other Useful Things

About

This is a resource page for LaTeX for students (and faculty) at the Department of Mathematics at the University of Oklahoma. Please contact Thomas Madsen for comments and suggestions for improvements.

Learning LaTeX

- Newest version of The Not So Short Introduction To LaTeX

Getting LaTeX

You need two things on your computer to use LaTeX. First you need to LaTeX itself. Then you need an editor. There are many different versions of both out there. Some cost money, but some are free.

- LaTeX Homepage (the official LaTeX homepage.)
- Miktex (A LaTeX implementation for Windows)
- Winshell (A **free** editor for Windows. Don't pay for your editor!)
- Emacs (Excellent **free** editor. Might be more complicated to install and use.)
- WinEdt (**Not free**. This editor has been installed on the computers at the math department .)
- WinFIG (A good **free** program for Windows for creating pictures that can be included in your tex-document.)

Templates

- Template for quizzes: quiz-template.tex, quiz-template.pdf
- Template for homework assignments: hw-template.tex, hw-template.pdf
- Template for exams: exam-template.tex, exam-template.pdf
- Template for a Ph.D. thesis: thesis--template.tex, thesis--template.pdf (Created by Eduardo Martinez Pedroza. Thank you Eduardo!)

Other useful things

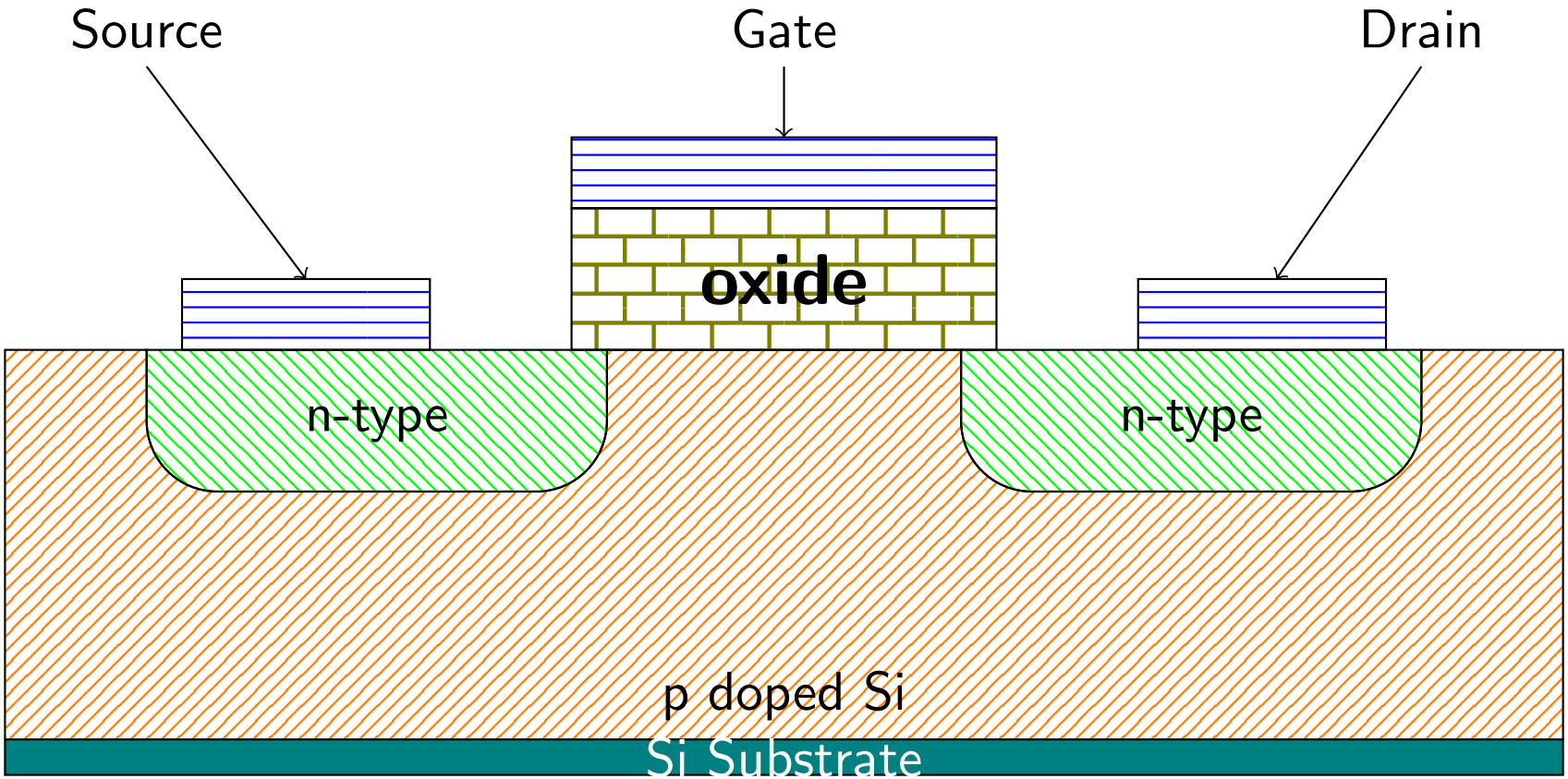
- List of symbols
- Foxit Reader for Windows (free, small, and fast pdf-viewer.)
- The (Not So) Short Introduction to LaTeX2e

Graphics Generation with TikZ

High quality vector images can be produced from within LaTeX using a package called TikZ.
Additionally, Inkscape can export TikZ directly.

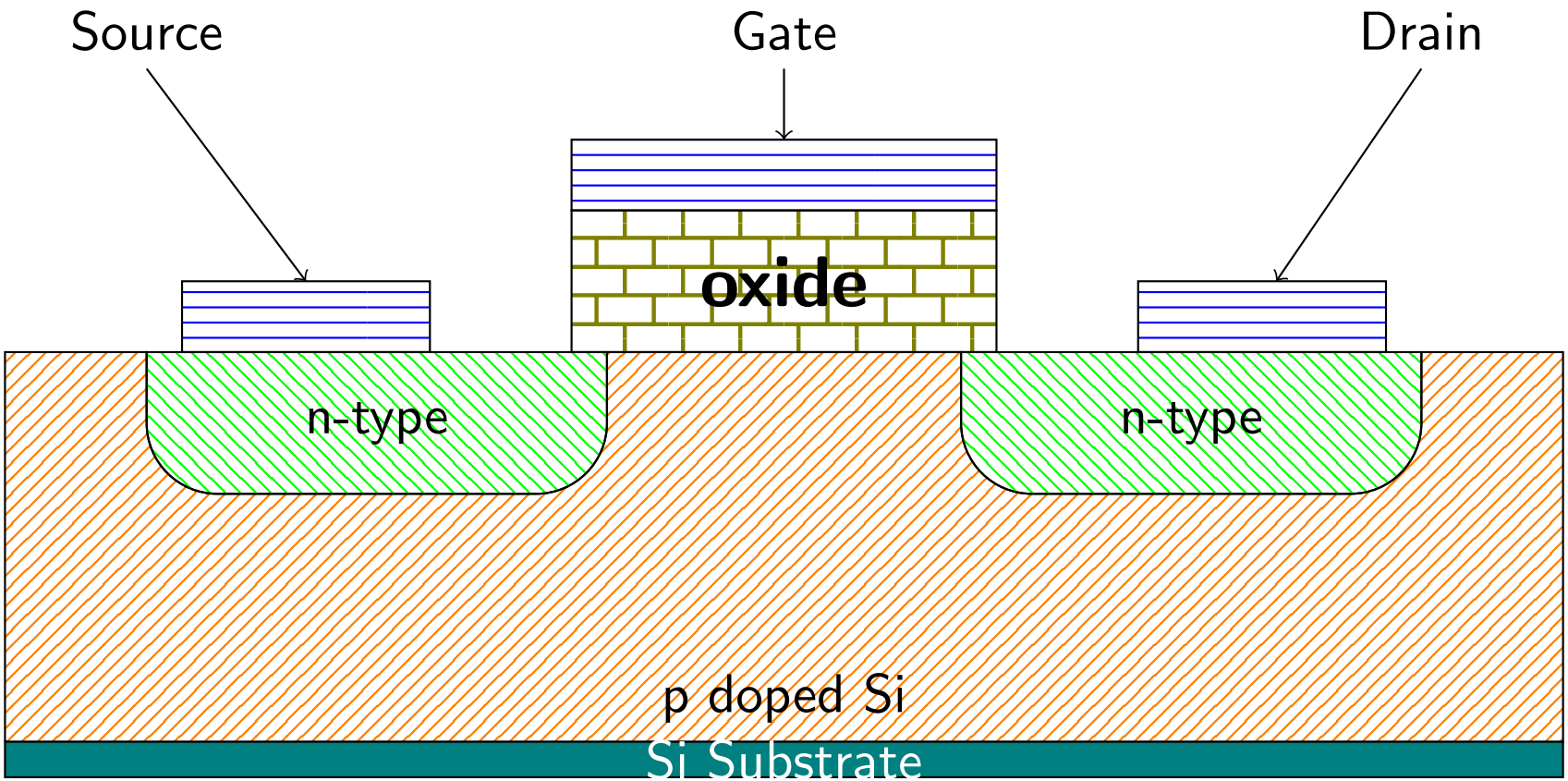
```
\begin{tikzpicture}
\draw \pdiff (0,.25) -- (0,3) -- (1,3) -- (1,2.5) to [out=270,in=180] (1.5,2) --
      (3.75,2) to [out=0,in=270] (4.25,2.5) -- (4.25,3) -- (6.75,3) --
     (6.75,2.5) to [out=270,in=180] (7.25,2) -- (9.5,2) to [out=0,in=270]
     (10,2.5) -- (10,3) -- (11,3) -- (11,.25) -- (0,.25) node [midway,above] {p
     doped Si};
\draw \metalthree (0,0) rectangle (11,.25) node [midway, color=white]
{Si Substrate};
\draw \oxide (4,3) rectangle (7,4) node [pos=.5,font=\bf\Large] {oxide};
\draw \metalone (4,4) rectangle (7,4.5);
\draw \ndiff (4.25,3) -- (1,3) -- (1,2.5) to [out=270,in=180] (1.5,2) --
     (3.75,2) to [out=0,in=270] (4.25,2.5) -- (4.25,3) node at (2.625,2.5) [
     align=center] {n-type};
\draw \ndiff (10,3) -- (6.75,3) -- (6.75,2.5) to [out=270,in=180] (7.25,2) --
     (9.5,2) to [out=0,in=270] (10,2.5) -- (10,3) node at (8.375,2.5) [align=
     center] {n-type};
\draw \metalone (1.25,3) rectangle (3,3.5);
\draw \metalone (8,3) rectangle (9.75,3.5);
\draw [->] (1,5) node [above] {Source} -- (2.125,3.5);
\draw [->] (10,5) node [above] {Drain} -- (8.975,3.5);
\draw [->] (5.5,5) node [above] {Gate} -- (5.5,4.5);
\node at (5.5,-.5) [align=center] {$V_{GS} < V_{threshold}$};
\end{tikzpicture}
```

MOSFET



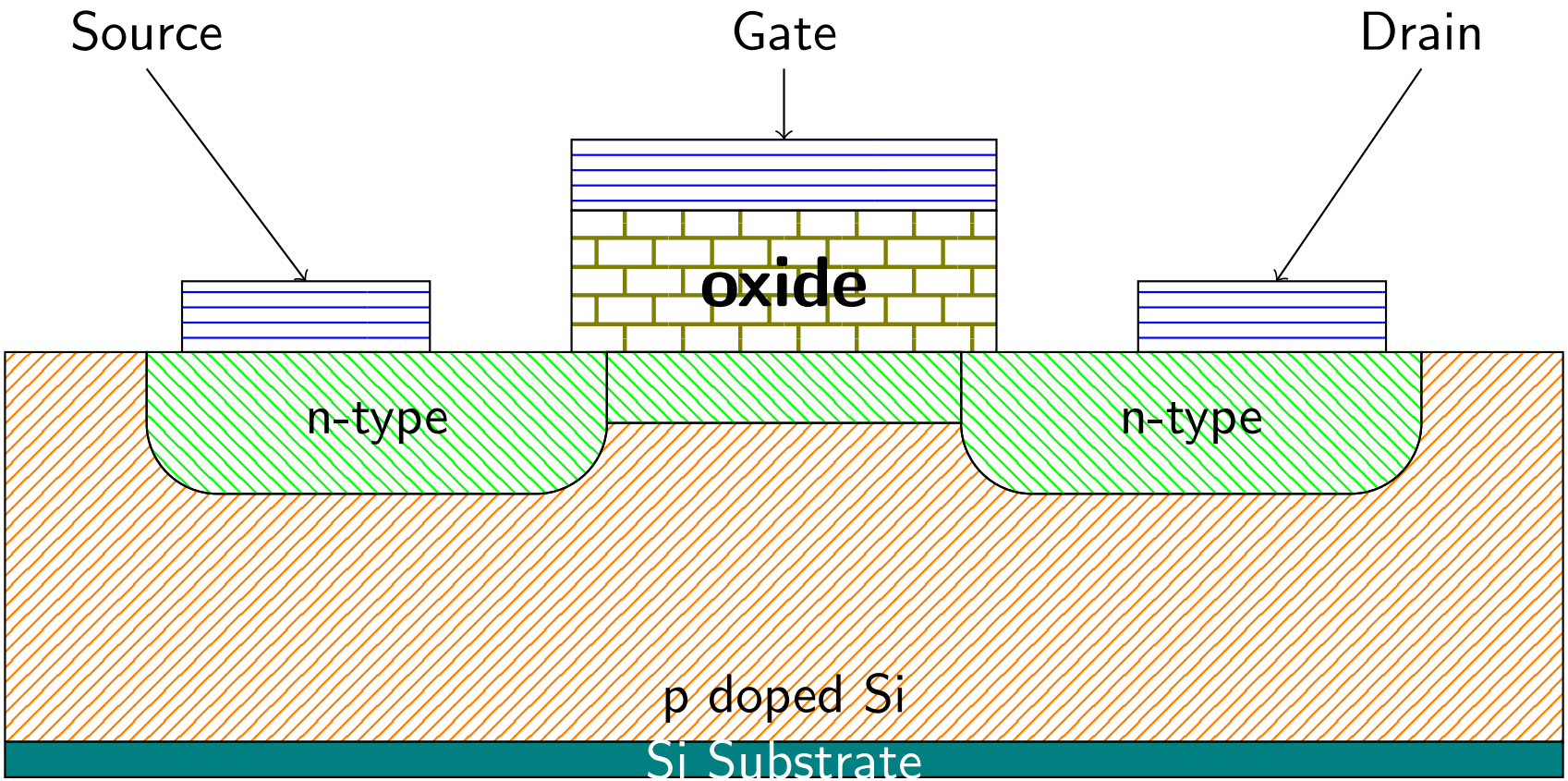
$$V_{GS} < V_{threshold}$$

MOSFET



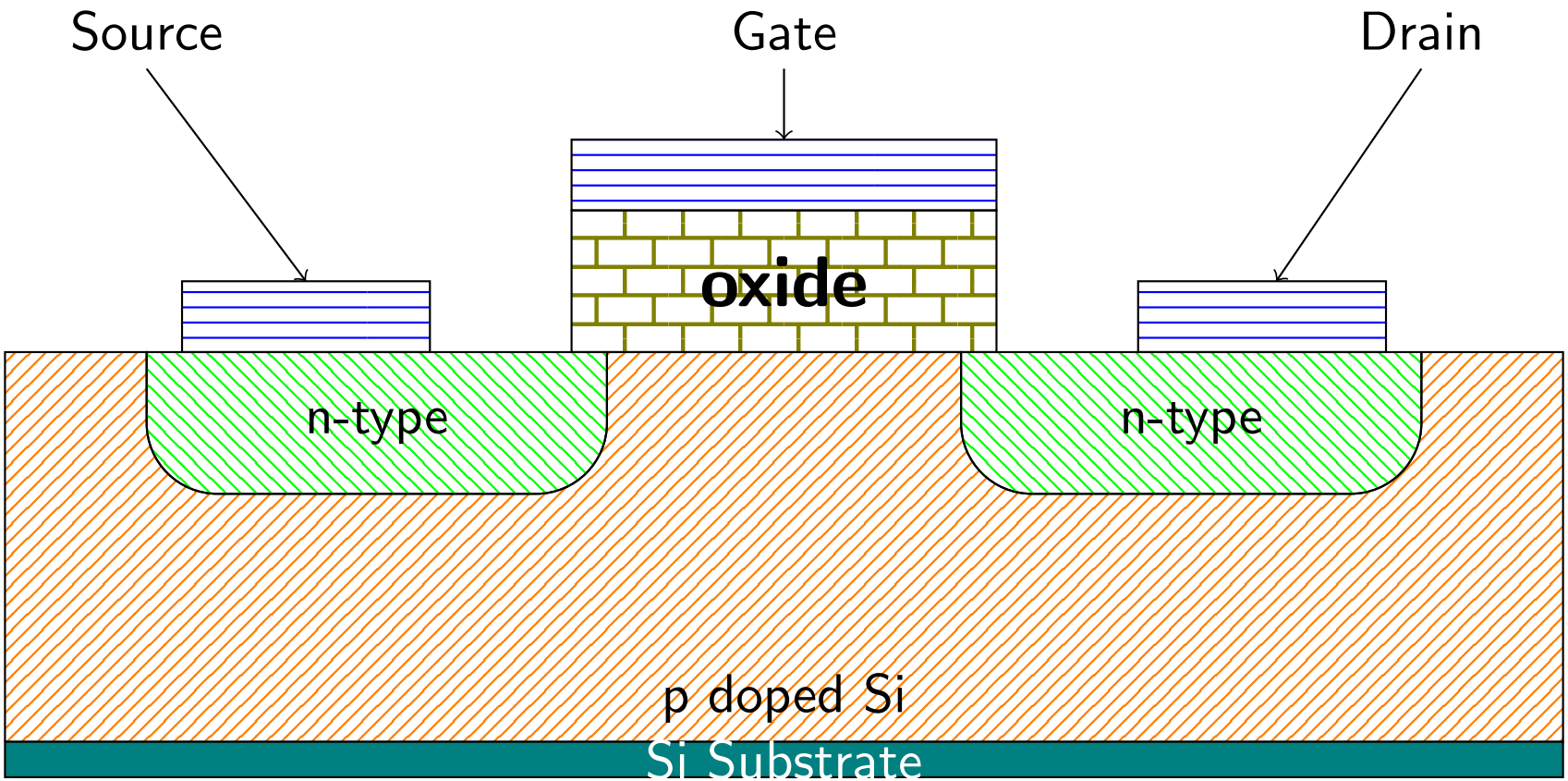
$$V_{GS} \geq V_{threshold}$$
$$V_{DS} < V_{GS} - V_{threshold}$$

MOSFET



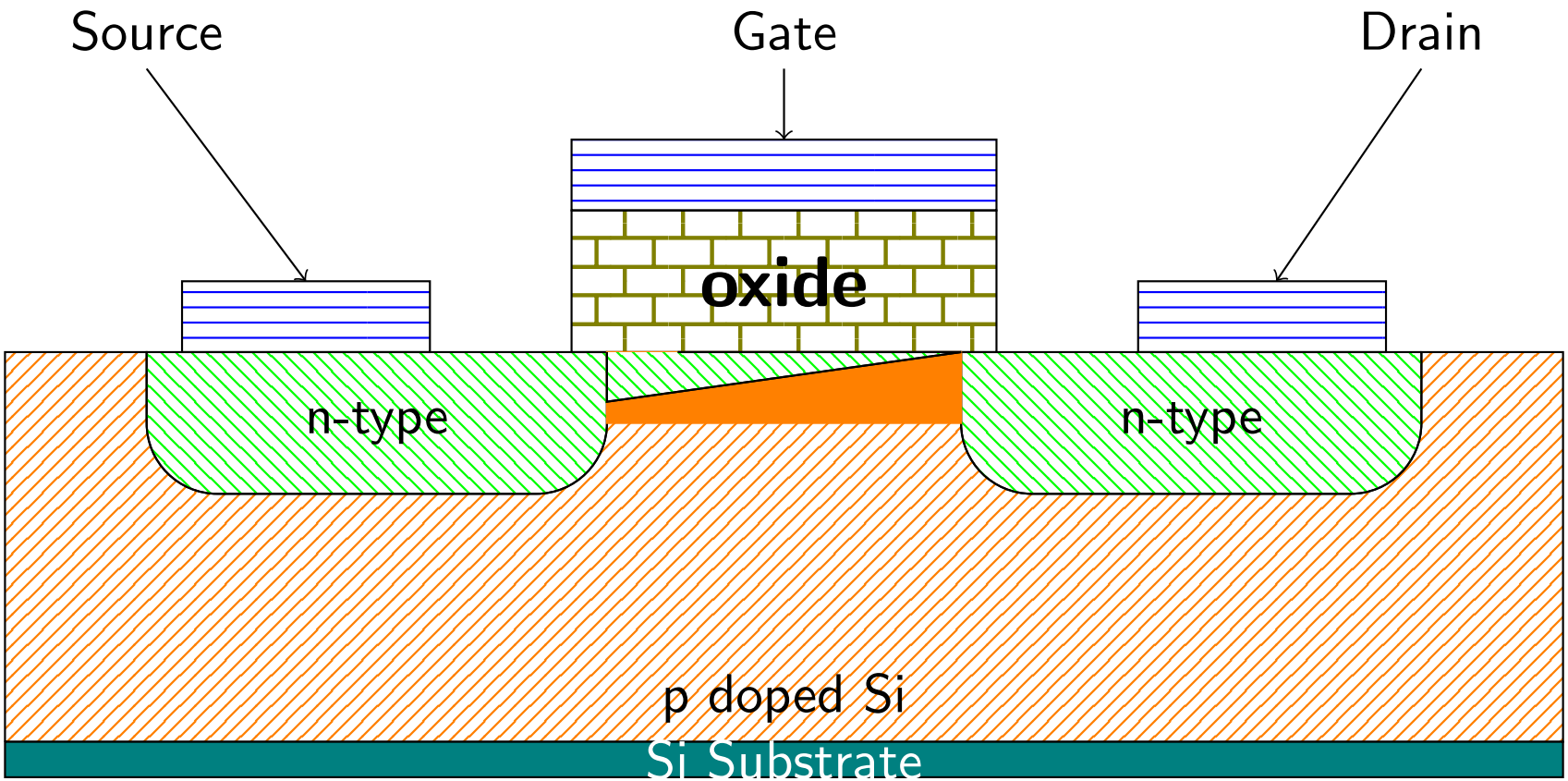
$$V_{GS} \geq V_{threshold}$$
$$V_{DS} < V_{GS} - V_{threshold}$$

MOSFET



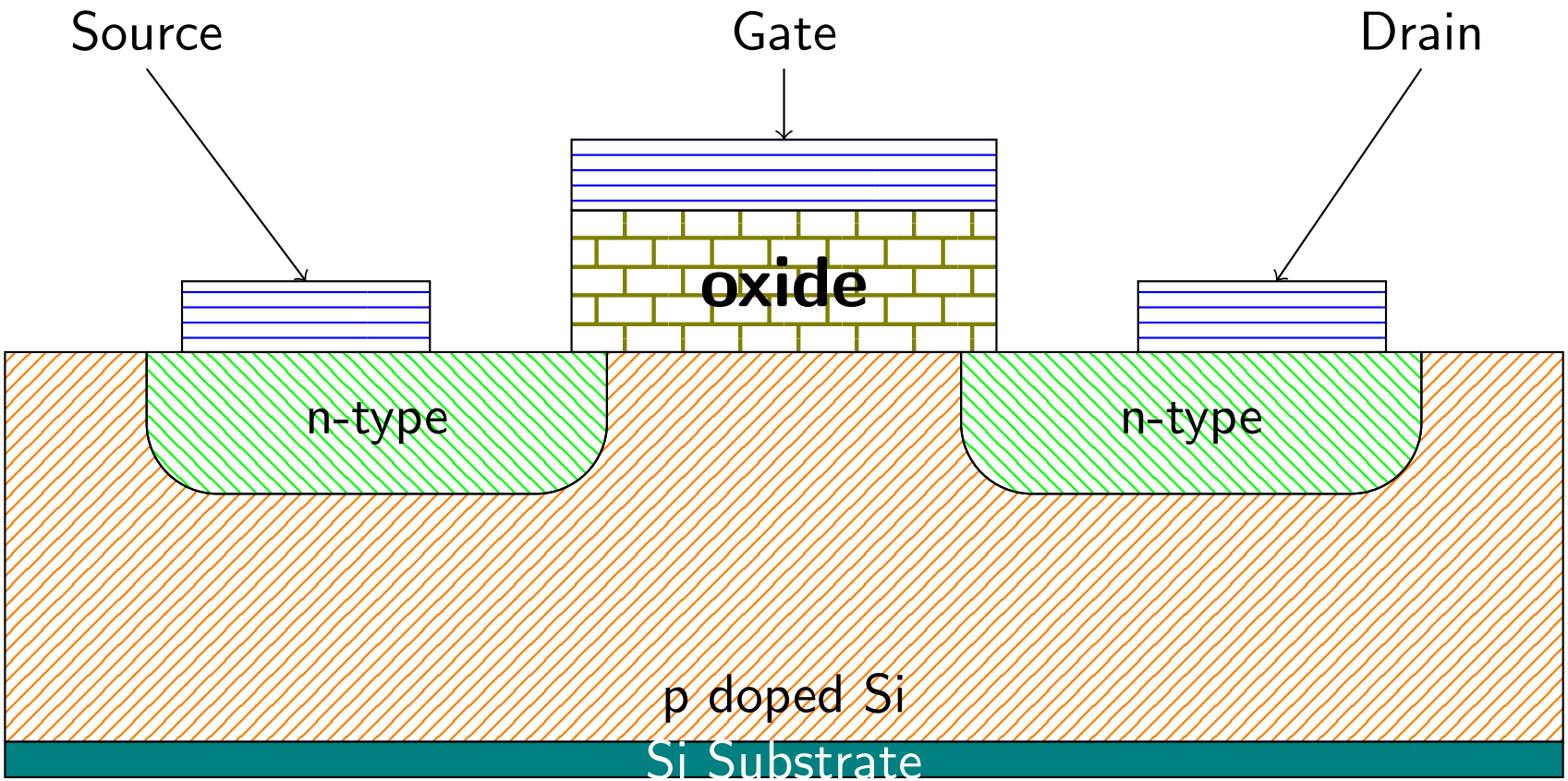
$$V_{GS} \geq V_{threshold}$$
$$V_{DS} = V_{GS} - V_{threshold}$$

MOSFET



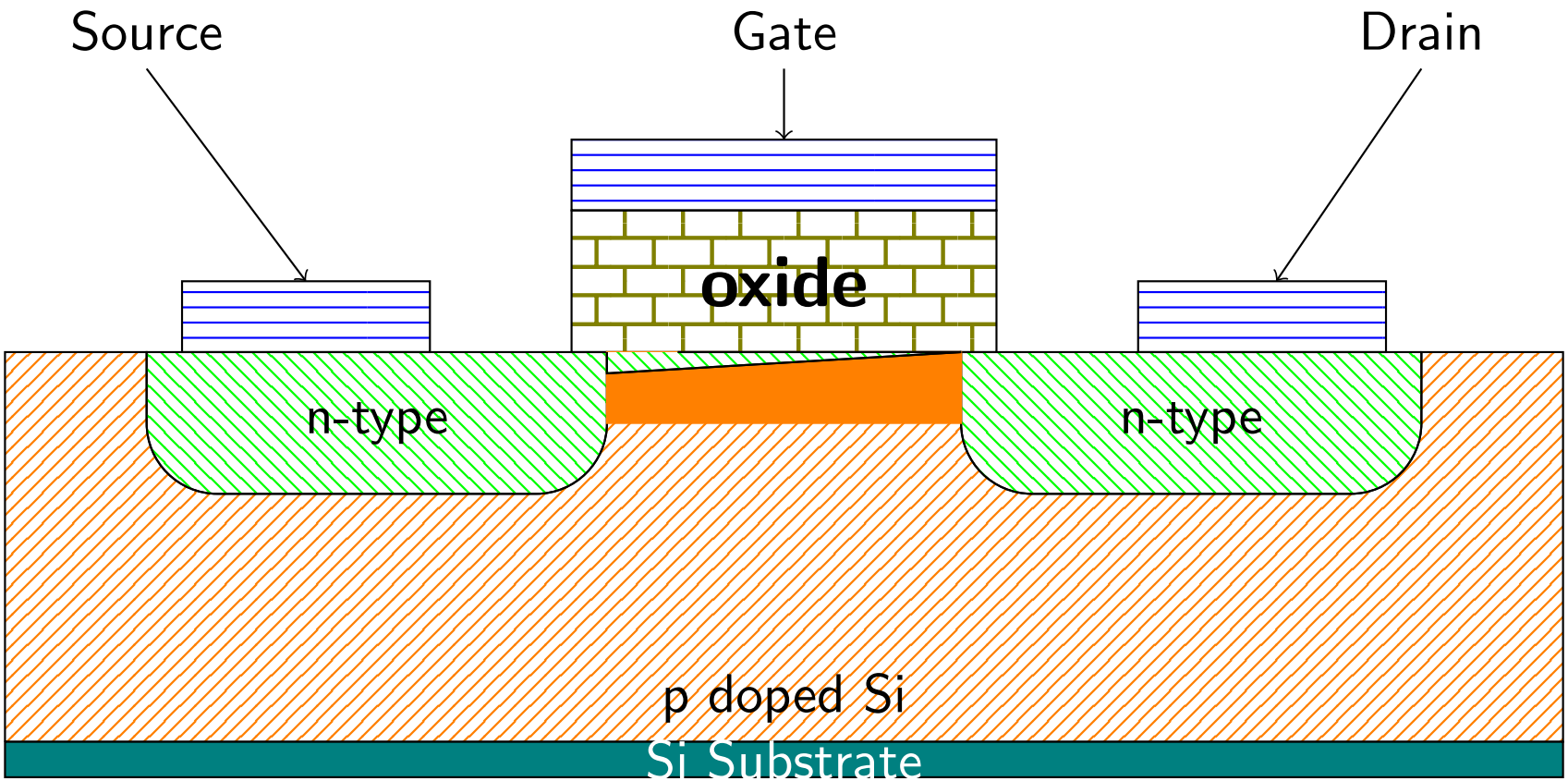
$$V_{GS} \geq V_{threshold}$$
$$V_{DS} = V_{GS} - V_{threshold}$$

MOSFET



$$V_{GS} \geq V_{threshold}$$
$$V_{DS} > V_{GS} - V_{threshold}$$

MOSFET



$$V_{GS} \geq V_{threshold}$$
$$V_{DS} > V_{GS} - V_{threshold}$$

Make a Custom Class

October 11, 2018

2.7 LOCATION AND FACILITIES

Redcedar Products is seeking an industrial facility near Stillwater, Oklahoma to start operations. It is estimated that currently, 25% of the state is covered with eastern redcedar (Figure 1). As satellite imaging shows (Figure 2), Payne county in particular has a large number of these trees in the vicinity. Considering access to plenty of foliage, Stillwater offers the benefits of proximity to a large research institution which can benefit company growth. The facility will offer storage for purchased foliage and a factory containing extraction equipment. A small office will be utilized for administration activities and a small conference room.

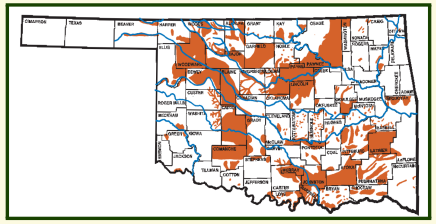


FIGURE 1: A CARTOON OF THE DISTRIBUTION OF REDCEDAR OVER OKLAHOMA.

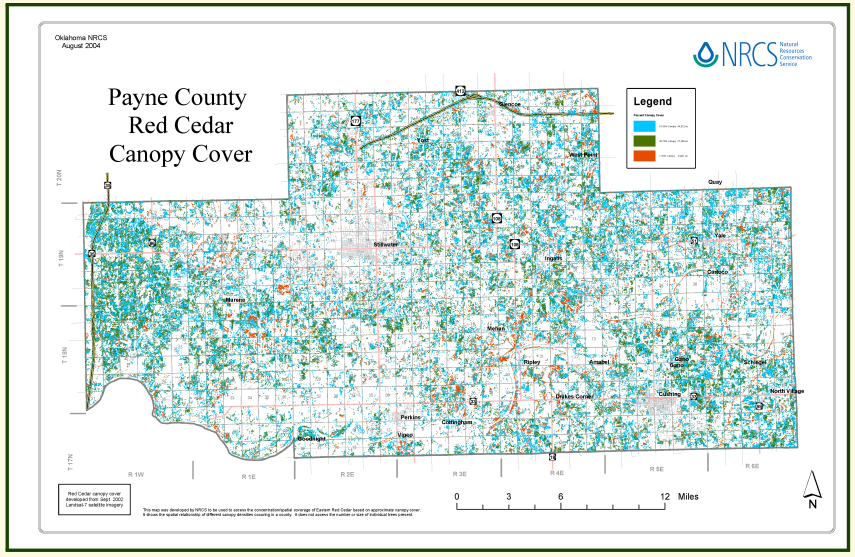
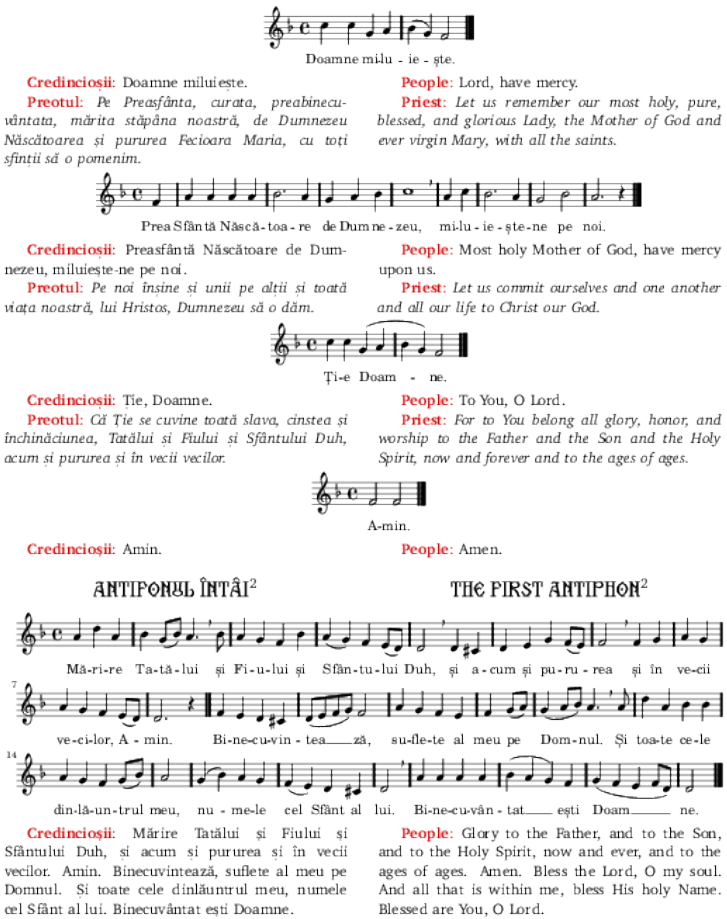


FIGURE 2: A DETAILED MAP OF THE REDCEDAR GROWTH IN PAYNE COUNTY PRODUCED FROM SATELLITE IMAGING COMPILED BY THE NRCS.

Make a Custom Class

https://github.com/ludus-leonis/nipajin

Make a Custom Class



http://www.liturghie.net/

Make a Custom Class

2 Creation de l'homme. Geneſe.

[m] en faiſons, [n]en iours,& en ans.
15 Et ſoyent pour luminaires au firmament du ciel, à fin de donner lumiere ſur la terre. Et fut faict ainſi.
16 Dieu donc fit deux grans luminaires:le plus grand luminaire pour [o] gouuerner le iour,& le moindre pour gouuerner la nuict:& les eſtoilles.
17 Et Dieu les mit en lʼeſtendue du ciel, pour luire ſur la terre,
18 Et pour gouuerner le iour, & la nuict,& pour ſeparer la lumiere des tenebres.Et Dieu vid que celà eſtoit bõ.
19 Lors fut faict le ſoir & le matin du quatrieme iour.
20 ¶ En apres Dieu dit, Que les eaux produiſent abondãment [p]reptile ayant ame viuante : & volaille vole ſur la terre enuers lʼeſtendue du ciel.
21 Dieu donc [q]crea de grãdes baleines, & toute creature viuante ſe mouuant, que les eaux produirent ſelon leur eſpece : & toute volaille ayant ailes chacune ſelon ſon eſpece : & Dieu vid que celà eſtoit bon.
22 Adonc [r]il les benit, diſant, Fructifiez, & multipliez, & rempliſſez les eaux des mers:& que la volaille ſe multiplie en la terre.
23 Lors fut faict le ſoir & le matin du cinquieme iour.
24 ¶ Outre Dieu dit,Que la terre produiſe creature viuante ſelon ſon eſpece, beſtail & reptile, & animau de la terre chacun ſelon leur eſpece. Et fut ainſi faict.
25 Dieu donc fit lʼanimau de la terre ſelon ſon eſpece, & le beſtail ſelon ſon eſpece, & tout le reptile de la terre ſelon ſon eſpece. Et Dieu vid que celà eſtoit bon.
26 Outreplus Dieu dit, [s]Faiſons [t]lʼhõme à [6v] noſtre image, & ſelon noſtre ſemblance, & qu'il ait domination ſur les poiſſons de la mer, & ſur les oiſeaux du ciel, & ſur les beſtes, & ſur toute la terre, & ſur tout reptile rampant ſur la terre.
27 Dieu donc crea lʼhomme à ſon image:[v]il les crea,*di-ie*,à lʼimage de Dieu: [x]il les crea maſle & femelle.
28 Et Dieu les benit,& leur dit,[y] Fructifiez,& multipliez,& rempliſſez la terre, & laſſubiettiſſez : & [z]ayez ſeigneurie ſur les poiſſons de la mer, & ſur les oiſeaux du ciel, & ſur tous animaux qui ſe mouuent ſur la terre.
29 Dauantage Dieu dit, Voici, ie vous ay donné toute herbe qui produit ſemence qui eſt ſur toute la terre,& tout arbre qui a en ſoy fruict dʼarbre produiſant ſemence : [a]à fin qu'ils vous ſoyent pour viande.
30 Meſmes auſſi à tous animaux de la terre,& à tous oiſeaux du ciel,& à toute choſe mouuãte ſur la terre,qui a en ſoy ame viuante, toute herbe verde ſera pour viande. Et fut ainſi faict.
31 [aa] [bb]Et Dieu vid tout ce qu'il auoit faict, & voilà il eſtoit moult bon. Lors fut faict le ſoir & le matin du ſixieme iour.

CHAP. II.

1 Dieu ſe repoſe le ſeptieme iour. 4 Et le beniſt. 8 Le iardin dʼEden. 9 Ce qui y eſt. 10 Et ce qui en ſort : & 15 auquel Dieu met lʼhomme, 19 donnant nom aux animaux. 18. 21 Crée la femme, 24 & inſtitue le mariage.

LEs cieux donc & la terre furent parfaicts, & tout lèxercite d'iceux:
2 [a]Car Dieu auoit accõpli au ſeptieme iour ſon œuure qu'il auoit faicte, [b]& ſe repoſa au ſeptieme iour de toute ſon œuure qu'il auoit faicte.
3 Et Dieu [c]benit le ſeptieme iour,& le ſanctifia: pour ce quèn icelui il auoit ceſſé de toute ſon œuure, qu'il auoit creée pour eſtre faicte.
4 Telles ſont les generations du ciel & de la terre,quand ils furent creés,au iour que le Seigneur Dieu fit le ciel & la terre,
5 Et tout ietton du champ deuãt qu'il fuſt en la terre, & tout herbage du champ deuant qu'il germaſt:car le Seigneur Dieu nàuoit point faict [d]plouuoir ſur la terre, & n'y auoit homme pour labourer la terre:
6 Mais vne vapeur mõtoit de la terre, qui arroiſoit tout le deſſus de la terre.
7 Or le Seigneur Dieu auoit formé l'homme [e]de la poudre de la terre,[f]& auoit inſpiré en la face dʼicelui ſpiration de vie, & l'homme fut faict en ame viuante.

Auſſi

https://github.com/raphink/geneve_1564

Make a Custom Class

https://github.com/alexisflesch/nexus

Unique Words and Hypenation

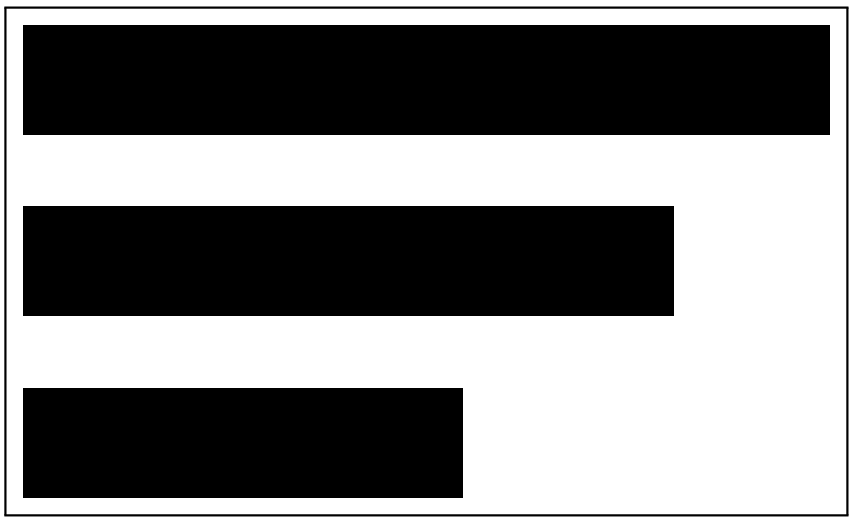
LaTeX automatically hyphenates words in the dictionary. What if you have something that isn't common?

```
\hyphenation{Red-ce-dar May-ap-ple Ok-la-ho-ma che-mo-ther
    -apy through}
```

Do calculations

LaTeXwasn't made for math, but you do have access to registers . . .

\usepackage{calc}



```
\newlength{\mylength}
\setlength{\mylength}{\
    textwidth}%
\noindent\rule{\mylength}{20pt}

\bigskip
\setlength{\mylength}{\
    textwidth-1cm}%
\noindent\rule{\mylength}{20pt}

\bigskip
\setlength{\mylength}{\
    textwidth-80pt+5mm-1bp}%
\noindent\rule{\mylength}{20pt}
```

Do calculations

. . . and floating points.

\usepackage{fp}

The following arithmetic is easy:

- $5+6=11$
- $2+3/5\times\pi=3.88496$

```
1 The following arithmetic is
      easy:
2 \begin{itemize}
3 \item \FPeval{\result}{clip
      (5+6)}%
4 $5+6=\result$
5 \item \FPeval{\result}{round
      (2+3/5*pi,5)}%
6 $2+3/5\times\pi=\result$
7 \end{itemize}
```

I use math for my consulting invoices.

Wesley Honeycutt

111 Chesapeake St.
Norman, OK 73019

(405) 555-5555
honeycutt@ou.edu

Invoice To:

Jimmy Gallogly
University of Oklahoma
660 Paddington Oval
Norman, OK 73019

Invoice Date:

October 11, 2018

Invoice Terms

Due on Receipt

Description of Services	Quantity	Unit Price	Amount
Purchased Materials			
Beard Growth Oil		$337.39	$337.39
Consulting Services			
July 9th, 2018	1.00 hours	$12.00	$12.00
July 10th, 2018	8.00 hours	$34.00	$272.00
July 11th, 2018	3.00 hours	$12.00	$36.00
July 14th, 2018	3.00 hours	$34.00	$102.00
July 15th, 2018	3.00 hours	$12.00	$36.00
July 20th, 2018	1.00 hours	$34.00	$34.00
July 21st, 2018	2.00 hours	$12.00	$24.00
July 31st, 2018	4.00 hours	$34.00	$136.00
Balance Due			**$989.39**

\microtype aka Giving in to typesetting

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Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

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\microtype aka Giving in to typesetting

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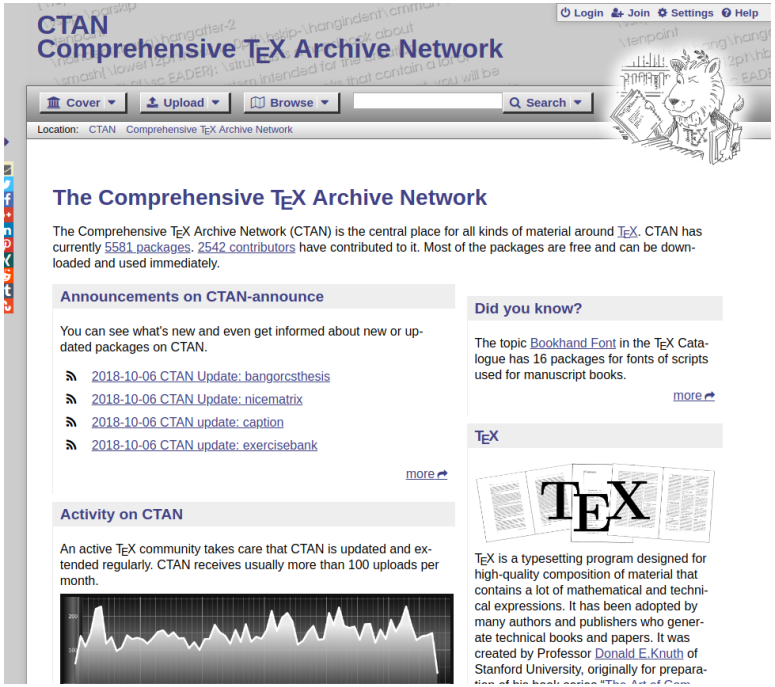
Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

RTFM

The Comprehensive TEX Archive Network is a package repository

This also includes manuals and examples



When in doubt: Google

TEX is older than the Happy Meal.

When in doubt: Google

TEX is older than the Happy Meal.

Someone has likely experienced your pain.

When in doubt: Google

TEX is older than the Happy Meal.

Someone has likely experienced your pain.

https://tex.stackexchange.com/

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Amanda Schilling
: Stem Services
: (405) 325-6126
: amanda.schilling@ou.edu

Office Hours: W/Th 8-9am in DAVIS
M 6-8pm in the Learning Lab

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: Research Data Specialist
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: laufers@ou.edu

Or contact me

I'm just a LaTeX junkie:

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: *I have an office phone?*
: honeycutt@ou.edu
: https://github.com/BlueNalgene