Math 291: Lecture 1

Prof. Fagerstrom

Minnesota State University Moorhead web.mnstate.edu/fagerstrom fagerstrom@mnstate.edu

January 11, 2018

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2 The Basics of Document Preparation

3 Environments

4 A Cool Example

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1 What is PT_EX ?

2 The Basics of Document Preparation

3 Environments

4 A Cool Example

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<ロト < 回 ト < 三 ト < 三 ト < 三 ト 三 の Q () January 11, 2018 3 / 20 What is ATEX?



MikTeX

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- MikTeX
- TeXnicCenter

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- MikTeX
- TeXnicCenter
- Ghostscript

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<ロト < 回 ト < 三 ト < 三 ト ミ の < ペ January 11, 2018 4 / 20 What is LATEX?



See Handout

- Prepared in essence by Dr. James
- I'll try to help (tech support is not my strength, but I can usually muddle on through)
- Can also use the campus labs

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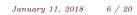
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• T_EX was developed by Donald Knuth in the 1970's. He used it to help him typeset the classic volume *The Art of Computer Programming*.

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- LATEX was originally a large set of macros developed by Leslie Lamport in 1985.

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M The History and Development of PT_EX

- T_EX was developed by Donald Knuth in the 1970's. He used it to help him typeset the classic volume *The Art of Computer Programming*.
- LATEX was originally a large set of macros developed by Leslie Lamport in 1985.
- LATEX has gone through many upgrades since then. Currently the American Mathematical Society has developed AMS-LATEX with more symbols and macros.

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\blacksquare The History and Development of $\blacksquare T_E X$

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- LATEX was originally a large set of macros developed by Leslie Lamport in 1985.
- LATEX has gone through many upgrades since then. Currently the American Mathematical Society has developed AMS-LATEX with more symbols and macros.
- Today, in mathematics, it is almost unacceptable to use anything else. Graduate math professors often expect homework handed in via LATEX.

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\blacksquare The History and Development of $\blacksquare T_E X$

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- LATEX was originally a large set of macros developed by Leslie Lamport in 1985.
- LATEX has gone through many upgrades since then. Currently the American Mathematical Society has developed AMS-LATEX with more symbols and macros.
- Today, in mathematics, it is almost unacceptable to use anything else. Graduate math professors often expect homework handed in via LATEX.
- Also used in physics (widely), computer science, and other physical sciences.

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What is BT_EX?

2 The Basics of Document Preparation

3 Environments

A Cool Example

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• Open a blank document using TeXnicCenter.

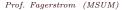
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- Open a blank document using TeXnicCenter.
- Type \documentclass{article}



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- Open a blank document using TeXnicCenter.
- Type \documentclass{article}
- Leave some space and type
 \begin{document}.
 Leave some additional space and type
 \end{document}

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- Open a blank document using TeXnicCenter.
- Type \documentclass{article}
- Leave some space and type

\begin{document}.

Leave some additional space and type

\end{document}

• The portion of the file between the statements \documentclass{article} and \begin{document} is called the Preamble.

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- Open a blank document using TeXnicCenter.
- Type \documentclass{article}
- Leave some space and type

\begin{document}.

Leave some additional space and type

\end{document}

- The portion of the file between the statements \documentclass{article} and \begin{document} is called the Preamble.
- This is where overall control of your document takes place. We'll use this area to add one package before the end of class today.

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\begin{document} and \end{document}

is the body of your document. This will contain (for the most part) all of the text that you want to see once your document has been compiled.

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\begin{document} and \end{document}

is the body of your document. This will contain (for the most part) all of the text that you want to see once your document has been compiled.

In the body, type

This is my first \LaTeX document.

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\begin{document} and \end{document}

is the body of your document. This will contain (for the most part) all of the text that you want to see once your document has been compiled.

In the body, type

This is my first \LaTeX document.

• Save your file in "Documents" as "Math291Week1".

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\begin{document} and \end{document}

is the body of your document. This will contain (for the most part) all of the text that you want to see once your document has been compiled.

In the body, type

This is my first \LaTeX document.

- Save your file in "Documents" as "Math291Week1".
- To compile this document, we use build command (after selecting the options we want). Set the build mode to $I a TeX \implies PS$ and then build

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\begin{document} and \end{document}

is the body of your document. This will contain (for the most part) all of the text that you want to see once your document has been compiled.

In the body, type

This is my first \LaTeX document.

- Save your file in "Documents" as "Math291Week1".
- To compile this document, we use build command (after selecting the options we want). Set the build mode to LaTeX ⇒ PS and then build.
- View the file by using the preview icon.
- Open the Documents folder. What do you see?

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- Go back to your document file in TeXnicCenter and change the cap X on the end of \LaTeX
 - to a lowercase x.

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- Go back to your document file in TeXnicCenter and change the cap X on the end of
 - \LaTeX

to a lowercase x.

• Build your document again. At the bottom it should tell you that you have 1 error.



• Go back to your document file in TeXnicCenter and change the cap X on the end of

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to a lowercase x.

- Build your document again. At the bottom it should tell you that you have 1 error.
- Press F9. This will take you to a description of the error.

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\LaTeX

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- Build your document again. At the bottom it should tell you that you have 1 error.
- Press F9. This will take you to a description of the error.
- It should say "undefined control sequence" \LaTex

Notice the break.

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• Go back to your document file in TeXnicCenter and change the cap X on the end of

\LaTeX

to a lowercase x.

- Build your document again. At the bottom it should tell you that you have 1 error.
- Press F9. This will take you to a description of the error.
- It should say "undefined control sequence"

\LaTex

Notice the break.

• Fix the mistake. (Remember that the LATEX command is case sensitive).

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$\blacksquare Reserved Symbols in \blacksquare T_EX$

Some "Reserved Symbols" in $\mbox{\sc brack}TEX$ are: $\, \sim,$ \$, %, &, #, _, {, }, and $\wedge.$

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$\blacksquare Reserved Symbols in \blacksquare T_EX$

Some "Reserved Symbols" in $\mbox{\sc brack}TEX$ are: $\, \sim,$ \$, %, &, #, _, {, }, and $\wedge.$

The reason these symbols are reserved is that they each perform a special function within $\[\] TEX.$

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M Reserved Symbols in PT_EX

Some "Reserved Symbols" in $\mbox{\sc brack}TEX$ are: \backslash , \sim , \$, %, &, #, _, {, }, and $\wedge.$

The reason these symbols are reserved is that they each perform a special function within $\[Mathebar]ET_{E}X$.

The \setminus indicates to PT_EX that there is a command rather than text.

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\blacksquare Reserved Symbols in $\blacksquare T_E X$

Some "Reserved Symbols" in $\mbox{\sc brack}TEX$ are: \backslash , \sim , \$, %, &, #, _, {, }, and $\wedge.$

The reason these symbols are reserved is that they each perform a special function within LATEX.

The \setminus indicates to $\mbox{\sc bt}TEX \,$ that there is a command rather than text. The \sim is a "hard space". Put one after the $\mbox{\sc bt}TEX \,$ command to fix the spacing issue in your document.

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$\blacksquare Reserved Symbols in \blacksquare T_EX$

Some "Reserved Symbols" in $\mbox{\sc brack}TEX$ are: $\backslash,$ \sim , \$, %, &, #, _, {, }, and $\wedge.$

The reason these symbols are reserved is that they each perform a special function within $\[Mathebar]EX$.

The \setminus indicates to $\mbox{\sc ETEX}$ that there is a command rather than text. The \sim is a "hard space". Put one after the $\setminus\mbox{\sc ETEX}$ command to fix the spacing issue in your document.

We will discuss the specific function of most of the rest of these later.

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1 What is BT_EX ?

2) The Basics of Document Preparation

3 Environments

A Cool Example

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• Documents created using LATEX are best thought of as being divided into different environments.

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M. Environments

- Documents created using LATEX are best thought of as being divided into different environments.
- We are going to change the statement that we originally wrote to make it a title.

M. Environments

- Documents created using LATEX are best thought of as being divided into different environments.
- We are going to change the statement that we originally wrote to make it a title.
- Before the statement write \begin{center}
 After the statement write \end{center}

M. Environments

- Documents created using LATEX are best thought of as being divided into different environments.
- We are going to change the statement that we originally wrote to make it a title.
- Before the statement write \begin{center}
 After the statement write

 \end{center}

• Build your document and see what happens.

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M. Environments

- Documents created using LATEX are best thought of as being divided into different environments.
- We are going to change the statement that we originally wrote to make it a title.
- Before the statement write
 - \begin{center}
 - After the statement write
 - \end{center}
- Build your document and see what happens.
- What if we want the text boldfaced? We could type the commands necessary by hand, but let's use TeXnicCenter to help us. Highlight the text and click the Boldfaced F on the top of the screen.

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- Documents created using LATEX are best thought of as being divided into different environments.
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 - \begin{center}

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- What if we want the text boldfaced? We could type the commands necessary by hand, but let's use TeXnicCenter to help us. Highlight the text and click the Boldfaced F on the top of the screen.



• Let's put our name before the title of this document.

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- Let's put our name before the title of this document.
- Above the title type <your name> \\ \today \\

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- Let's put our name before the title of this document.
- Above the title type <your name> \\ \today \\
- Next, since we want this text to be in the upper right hand corner, we highlight and click on the flushright icon.

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- Let's put our name before the title of this document.
- Above the title type <your name> \\ \today \\
- Next, since we want this text to be in the upper right hand corner, we highlight and click on the flushright icon.
- Build and see how the output has been modified.

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Math 291: Lecture 1

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January 11, 2018 14 / 20



• The main power of LATEX is its ability to typeset mathematical formulas quickly and easily.

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- The main power of LATEX is its ability to typeset mathematical formulas quickly and easily.
- The math environment is invoked by using the symbol: \$.

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The Math Environment

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January 11, 2018 15 / 20

The Math Environment

- $\bullet\,$ The main power of $\mbox{\sc eTE}X$ is its ability to typeset mathematical formulas quickly and easily.
- The math environment is invoked by using the symbol: \$.
- To see this, first type

\$x^n\$

- Build your document and see the output.
- Next, add

\$x_n\$

• Then build again.

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January 11, 2018 15 / 20



Let's type a polynomial. Use what you now know to add following polynomial to your document.

$$2x^{10} - x^8 + 5x^3$$

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Let's type a polynomial. Use what you now know to add following polynomial to your document.

$$2x^{10} - x^8 + 5x^3$$

How many of you got:

$$2x^10 - x^8 + 5x^3?$$

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• When you want to apply a command to an object with more than one character within it, you need to use { and }.

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- When you want to apply a command to an object with more than one character within it, you need to use { and }.
- To get the correct polynomial from the previous slide we type 2x^{10}-x^8+5x^3

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Math 291: Lecture 1

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- When you want to apply a command to an object with more than one character within it, you need to use { and }.
- To get the correct polynomial from the previous slide we type 2x^{10}-x^8+5x^3
- Try this and build your document.

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 To create the fraction ¹/₂, we type \$\frac{1}{2}\$

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- To create the fraction ¹/₂, we type
 \$\frac{1}{2}\$
- Try it and build.

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- To create the fraction ¹/₂, we type
 \$\frac{1}{2}\$
- Try it and build.
- To create the fraction ^{1/3 x³}/_{1/2 x²}, we type
 \$\frac{\frac{1}{3}x^3}{\frac{1}{2}x^2}\$

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Math 291: Lecture 1

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- To create the fraction ¹/₂, we type
 \$\frac{1}{2}\$
- Try it and build.
- To create the fraction ^{1/3}/₂x³, we type
 \$\frac{\frac{1}{3}x^3}{\frac{1}{2}x^2}\$
- Try it and build.

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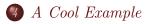
< □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □

A Cool Example



2) The Basics of Document Preparation

3 Environments



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• Suppose you are explaining polynomial long division to a group of people and you don't want to go through the trouble of manually typing out the solution to the example that you are using to illustrate it.

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- Suppose you are explaining polynomial long division to a group of people and you don't want to go through the trouble of manually typing out the solution to the example that you are using to illustrate it.
- In your preamble (that is, between the documentclass and begin commands) type

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- Suppose you are explaining polynomial long division to a group of people and you don't want to go through the trouble of manually typing out the solution to the example that you are using to illustrate it.
- In your preamble (that is, between the documentclass and begin commands) type

 Now in your document somewhere type \$\polylongdiv{x^3+x^2-1}{x-1}\$

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- Suppose you are explaining polynomial long division to a group of people and you don't want to go through the trouble of manually typing out the solution to the example that you are using to illustrate it.
- In your preamble (that is, between the documentclass and begin commands) type

• Now in your document somewhere type

 $\operatorname{v}_{x^3+x^2-1}_{x-1}$

• Now build your document, and see what happens.

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- Suppose you are explaining polynomial long division to a group of people and you don't want to go through the trouble of manually typing out the solution to the example that you are using to illustrate it.
- In your preamble (that is, between the documentclass and begin commands) type

• Now in your document somewhere type

 $\operatorname{v}_{x^3+x^2-1}_{x-1}$

- Now build your document, and see what happens.
- This is the power of LATEX.

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