My lecture about LaTeX
This page is a demonstrative "front matter"

More On LaTeX
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June 8, 1997

In this lecture we will discuss the following subjects:

- How to prepare a slide show
- Math in LaTeX

How To Prepare a Slide Show Or SLITeX

1. What Is SLITeX ?
2. The Root File
3. The Slide File
4. Making Only Some Slides

What Is SLITEX

SLITEX is an extension of LaTEX which provides us with a simple way of making black-and-white or color slides. This mechanism is needed because slides differ from the other supplied environments, such as article, book, letter, report, in the following points:

- Font Size
- Separate Pages
- Overlays
- Notes
- Centering
- Selective Printing

The Root File

The input to SLITEX consists of a root file and a separate slide file. The root file begins with the usual `\documentstyle{slides}`. The `slides` document style is the standard for producing slides (there are no standard options). The `\documentstyle{slides}` is followed by the preamble which, as usual, contains only declarations, followed in turn by the `\begin{document}` command .

Any text after the `\begin{document}` is treated as "front matter" and not as slide material. The text for the slides is contained in a separate slides-file we will see later on. Black-and-white slides are generated by placing the command `\blackandwhite{file_name}` in the root file. As usual, the root file ends with the `\end{document}` command.

This is a demonstration of a slide root file:

```
\documentstyle{slides}
\begin{document}
\My lecture about \LaTeX \\
\This page is a demonstrative ‘‘front matter’’
\blackandwhite{myslides}
\end{document}
```

In fact, this is the root file which was used to produce this lecture.

The Slide File

- Slides
- Overlays
- Notes
- Page Styles for Slides

Slides

Each slide is produced by the **slide** environment in the following manner:

```
\begin{slide}{}
...
\end{slide}
```

The text appearing on a slide is written with ordinary LaTeX commands. Output generated by SLITEX differs from ordinary LaTeX output in two ways:

1. Centering
2. Font size

Overlays

The **overlay** environment is for making a slide which is meant to be placed on top of another. It is the same as the **slide** environment except for the way the pages are numbered. The first overlay following slide number 9 is numbered "9-a", the second is numbered "9-b" and so on. The slide and the overlay should be identical except that text visible in one is invisible in the other.

Invisible Text

We will use a new SLITEX command `\invisible`. This command is a special color declaration for invisible text. Invisible text will not appear in the text, but space will be reserved for it so we can lay out overlays properly.

This is the example page.

Overlay

Which contains a little surprise.

put something funny here

Overlay Example

This slide is an example for overlay text. The following SLITEX commands will generate the overlays:

```
\begin{slide}{}
  This is the {\invisible Overlay} example page.
  {\invisible Which contains a little surprise.}
  {\invisible put something funny here}
\end{slide}

\begin{overlay}{}
  {\invisible This is the} Overlay \invisible example page.
  {\invisible Which contains a little surprise.}
  {\invisible put something funny here}
\end{overlay}

\begin{overlay}{}
  {\invisible This is the Overlay  example page.}
  Which contains a little surprise.
  {\invisible put something funny here}
\end{overlay}

\begin{overlay}{}
  {\invisible This is the Overlay example page.
   Which contains a little surprise.}
   put something funny here
\end{overlay}
```


Notes

- An environment for producing a one-page note.
- A note appears only in black-and-white version of the slides.
- Numbered like overlays (sequentially) but with numbers, i.e, a note after 15 will be numbered 15.1˙

  No slide's frame.

• Note Example

The following code will produce the next page which is a note :

```
\begin{note}
This is a note to myself, perhaps reminding
 me to check and see if anybody is awake.
\end{note}
```


This is a note to myself, perhaps reminding me to check and see if anybody is awake.

Page Styles for Slides

There are three different page styles for slides:

headings - Numbering and alignment style (default).

plain - Numbering and no alignments.

empty - No numbering and no alignments.

Making Only Some Slides

It is sometimes convenient to generate only some of the slides from the input file. There are several way to do this:

- Numbered slides: `\onlyslides{4,8}`
- Ranged slides: `\onlyslides{4,8,9-12}`
- Nonexistent slides: `\onlyslides{10-9999}`
- Only Notes: `\onlynotes{6,7}`

These commands must be placed in the root file.

Summary

SLITEX is a very powerful instrument allowing us to easily create slides with LaTeX, adding many slides features such as:

1. Overlays
2. Notes
3. Automatic centered text
4. Alignment marks & slide numbering

Math in LaTeX

This part of the lecture will consist mainly of simple and complex mathematical formulas in LaTeX. We will discuss several topics:

- Some Common Structures
- Mathematical Symbols
- Putting One Thing Above Another

Some Common Structures

The common structures we will see are the following:

- Subscripts and Superscripts
- Fractions
- Roots
- Ellipsis

Subscripts and Superscripts

Subscripts and superscripts are made with the _ and ^ commands. These commands can be combined to make complicated subscripts and superscripts expressions.

x^{2y}	`x^{2y}`	$x^{y^{z^t}}$	`x^{y^{z^{t}}}`	x_1^y	`x^{y}_{1}`
x_{2y}	`x_{2y}`	$x^{y_{z_t}}$	`x^{y_{z_{t}}}`	x_y^1	`x_{y}^{1}`

Fractions

Fractions are made with the / symbol or the `\frac` command. Frac is used for large fractions in displayed formulas. It has two arguments: the numerator and the denominator.

Fractions Example

- / example:
  Typing: `Dividing 3 by 2 gives $3/2$`
  Will produce: Dividing 3 by 2 gives $3/2$

- *Frac* examples:

  $x = \frac{y+z/2}{y^2+1}$ `\[ x = \frac{y+z/2}{y^{2}+1} \]`

  $\frac{x+y}{1+\frac{y}{z+1}}$ `\[ \frac{x+y}{1+\frac{y}{z+1} \]`

Roots

The `\sqrt` command produces the square root of its argument. There is an optional first argument for the other roots.

For example: `A square root \( \sqrt{x+y} \)` `and an {\it n}th root \(\sqrt[n]{2} \).`

Will produce: A square root $\sqrt{x+y}$ and an *n*th root $\sqrt[n]{2}$.

Ellipses

The command `\ldots` and `\cdots` produce two different kinds of ellipses(...).

- `\cdots` - Centered Ellipses:
  $a + \cdots + z$ `$a + \cdots + z$`
- `\ldots` - Low Ellipses:
  $x_1, \ldots, x_n$ `$x_{1}, \ldots ,x{n}$`

There are also vertical and diagonal ellipses (for arrays) :
$\vdots$ `$\vdots$` $\ddots$ `$\ddots$`

Mathematical Symbols

- TEX commands allow us to produce almost any mathematical symbol.
- Most of these commands can be used only in math mode.
- We will see several topics:
  1. Greek Letters
  2. Calligraphic Letters
  3. A Menagerie of Mathematical Symbols
  4. Log-like Functions

Greek Letters

- Lowercase Greek letters by adding a \ to the letter name.
- Uppercase Greek letters by capitalizing the first letter of the command name.
- Variant forms of several Greek letters.

Example:

```
Making lowercase $\phi$ is easy as
making uppercase $\Phi$ and also easy
as making another form of $\varphi$.
```

Making lowercase ϕ is easy as making uppercase Φ and also easy as making another form of φ.

Calligraphic Letters

TeX provides twenty-six uppercase calligraphic letters, which can be produce by the `\cal` declaration.
Example: $\mathcal{A}$,$\mathcal{B}$,$\mathcal{C}$,$\mathcal{D}$,...,$\mathcal{Z}$.

A Menagerie of Mathematical Symbols

TeX can make lots of special mathematical symbols. In the following slides we will see some examples. Additional examples can be found in "LaTeX — User's Guide and Reference Manual" by Leslie Lamport.

$\pm$	`\pm`	$\cap$	`\cap`	$\diamond$	`\diamond`	$\oplus$	`\oplus`
$\mp$	`\mp`	$\cup$	`\cup`	$\bigtriangleup$	`\bigtriangleup`	$\ominus$	`\ominus`
$\times$	`\times`	$\uplus$	`\uplus`	$\bigtriangledown$	`\bigtriangledown`	$\otimes$	`\otimes`
$\div$	`\div`	$\sqcap$	`\sqcap`	$\triangleleft$	`\triangleleft`	$\oslash$	`\oslash`
$\ast$	`\ast`	$\sqcup$	`\sqcup`	$\triangleright$	`\trianglerght`	$\odot$	`\odot`
$\star$	`\star`	$\vee$	`\vee`	$\lhd$	`\lhd`	$\bigcirc$	`\bigcirc`
$\circ$	`\circ`	$\wedge$	`\wedge`	$\rhd$	`\rhd`	$\dagger$	`\dagger`
$\bullet$	`\bullet`	$\setminus$	`\setminus`	$\unlhd$	`\unlhd`	$\ddagger$	`\ddagger`
$\cdot$	`\cdot`	$\wr$	`\wr`	$\unrhd$	`\unrhd`	$\amalg$	`\amalg`

$\aleph$	`\aleph`	$\prime$	`\prime`	$\forall$	`\forall`	∞	`\infty`
$\hbar$	`\hbar`	$\emptyset$	`\emptyset`	$\exists$	`\exists`	$\Box$	`\Box`
$\imath$	`\imath`	∇	`\nabla`	$\neg$	`\neg`	$\Diamond$	`\Diamond`
$\jmath$	`\jmath`	$\surd$	`\surd`	$\flat$	`\flat`	$\triangle$	`\triangle`
ℓ	`\ell`	$\top$	`\top`	$\natural$	`\natural`	$\clubsuit$	`\clubsuit`
$\wp$	`\wp`	$\bot$	`\bot`	$\sharp$	`\sharp`	$\diamondsuit$	`\diamondsuit`
$\Re$	`\Re`	$\Vert$	`\\|`	$\backslash$	`\backslash`	$\heartsuit$	`\heartsuit`
$\Im$	`\Im`	$\angle$	`\angle`	∂	`\partial`	$\spadesuit$	`\spadesuit`
$\mho$	`\mho`	$\sum$	`\sum`	$\prod$	`\prod`	$\coprod$	`\coprod`

$\leftarrow$	`\leftarrow`	$\longleftarrow$	`\longleftarrow`	$\uparrow$	`\uparrow`
$\Leftarrow$	`\Leftarrow`	$\Longleftarrow$	`\Longleftarrow`	$\Uparrow$	`\Uparrow`
$\rightarrow$	`\rightarrow`	$\longrightarrow$	`\longrightarrow`	$\downarrow$	`\downarrow`
$\Rightarrow$	`\Rightarrow`	$\Longrightarrow$	`\Longrightarrow`	$\Downarrow$	`\Downarrow`
$\leftrightarrow$	`\leftrightarrow`	$\longleftrightarrow$	`\longleftrightarrow`	$\updownarrow$	`\updownarrow`
$\Leftrightarrow$	`\Leftrightarrow`	$\Longleftrightarrow$	`\Longleftrightarrow`	$\Updownarrow$	`\Updownarrow`
$\mapsto$	`\mapsto`	$\hookrightarrow$	`\hookrightarrow`	$\nearrow$	`\nearrow`
$\leftharpoonup$	`\leftharpoonup`	$\rightharpoonup$	`\rightharpoonup`	$\searrow$	`\searrow`
$\leftharpoondown$	`\leftharpoondown`	$\rightharpoondown$	`\rightharpoondown`	$\swarrow$	`\swarrow`
$\hookleftarrow$	`\hookleftarrow`	$\hookrightarrow$	`\hookrightarrow`	$\nwarrow$	`\nwarrow`
$\rightleftharpoons$	`\rightleftharpoons`	$\leadsto$	`\leadsto`		

Log-like Functions

- Logarithm function - `\log` command.
  Example:
  `\( \log xy = \log x + \log y \)`
  $\log xy = \log x + \log y$
- Other commands in the next slides.
- `\bmod` - binary modulo relation.
  Example:
  `\( \gcd(m,n) = a \bmod b \)`
  $\gcd(m,n) = a \bmod b$
- `\pmod` - parenthesized modulo expression.
  Example:
  `\( x \equiv y \pmod{a+b} \)`
  $x \equiv y \pmod{a+b}$

Log-like Functions table

$\backslash arccos$	$\backslash cos$	$\backslash csc$	$\backslash exp$
$\backslash arcsin$	$\backslash cosh$	$\backslash deg$	$\backslash gcd$
$\backslash arctan$	$\backslash cot$	$\backslash det$	$\backslash hom$
$\backslash arg$	$\backslash coth$	$\backslash dim$	$\backslash inf$

Log-like Functions table (cont'd)

$\backslash ker$	$\backslash lg$	$\backslash min$	$\backslash sinh$
$\backslash lim$	$\backslash ln$	$\backslash Pr$	$\backslash sup$
$\backslash limsup$	$\backslash log$	$\backslash sec$	$\backslash tan$
$\backslash liminf$	$\backslash max$	$\backslash sin$	$\backslash tanh$

Putting One Thing Above Another

There are several cases when we need to place one object above another:

1. Accents.
2. Overlining and Underlining.
3. Stacking Symbols.

Accents

There are special commands for putting accents above a letter. They can be produced by the commands in the following table.

$\hat{a}$	`\hat{a}`	$\acute{a}$	`\acute{a}`
$\check{a}$	`\check{a}`	$\grave{a}$	`\grave{a}`
$\breve{a}$	`\breve{a}`	$\tilde{a}$	`\tilde{a}`
$\bar{a}$	`\bar{a}`	$\vec{a}$	`\vec{a}`
$\dot{a}$	`\dot{a}`	$\ddot{a}$	`\ddot{a}`

Accents (cont'd)

- Wide version of `\hat` and `\tilde` - `\widehat` and `\widetilde`.
  Example:

  typing `\(\widehat{1-x} = \widetilde{-d}\)`

  results $\widehat{1-x} = \widetilde{-d}$

- The letter i and j should lose the dots when accented. They are produced by the `\imath` and `\jmath` commands.
  Example:

  typing `\( \vec{\imath} + \tilde{\jmath} \)`

  results $\vec{\imath}+\tilde{\jmath}$

Overlining and Underlining

- Horizontal line above an argument - `\overline`
  Example:

  typing `\( \overline{\overline{y}^{5} + 9} \)`

  result $\overline{\overline{y}^{5}+9}$

- Horizontal line under an argument - `\underline`
  Example:

  typing `\underline{Important} stuff is underlined`

  result <u>Important</u> stuff is underlined

Overlining and Underlining - (cont'd)

- Horizontal braces above an argument - `\overbrace`
  Example:

  typing `\( \overbrace{a + b + c + d} \)`

  result $\overbrace{a+b+c+d}$

- Horizontal braces under an argument - `\underbrace`
  Example:

  typing `\[ \underbrace{a + \overbrace{b + \cdots + y}^{24} + z }_{26} \]`

  result

$$\underbrace{a+\overbrace{b+\cdots+y}^{24}+z}_{26}$$

Stacking Symbols

The `\stackrel` command stacks one symbol above another.
Example:

typing `\( A \stackrel{a'}{\rightarrow} B \)`

results $A \stackrel{a'}{\rightarrow} B$

typing `\( \vec{x} \stackrel{def}{=}(x_{1}, \ldots,x_{n})\)`

results $\vec{x} \stackrel{def}{=}(x_{1},\ldots,x_{n})$

Summary

TEX is a very powerful instrument allowing us to make almost any mathematical symbol and formula.

THE END