LaTeX Course at ICT School

Basics and tips for your first LaTeX document

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Course overview

1. Basics and tips for your first LaTeX document

Course overview

1. Basics and tips for your first LaTeX document

2. Let's add some mathematics

Course overview

1. Basics and tips for your first LaTeX document
2. Let's add some mathematics
3. Illuminate your work with color and illustrations

Where to find more informations? First in books

Donald E. Knuth. *The TEXbook : a complete user's guide to computer typesetting with TEX*. Addison-Wesley, Jan. 11, 1984.

Frank Mittelbach et al. *The LATEX Companion (Tools and Techniques for Computer Typesetting)*. 2nd Edition. Addison-Wesley Professional, May 2, 2004.

Where to find more informations? But also on the Internet


LaTeX3 Project Team. *LaTeX documentation.* URL: http://www.latex-project.org/guides/.


CTAN. *Comprehensive TeX Archive Network.* 1993. URL: http://ctan.org.


TUG. *The TeX Users Group web site.* 1980. URL: http://ctan.org.

What is (LA)TEX?

At the beginning was TEX:

- A typesetting tool from Donald Knuth for *The Art of Computer Programming*
- Good text and mathematic typography
- Released in 1978
- Turing complete lambda-calculus

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Then came LATEX:

- A set of macros based on TEX by Leslie LAMPORT
- Easier than TEX or not
- Higher level
- A markup language

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- Higher level
- A markup language

A markup language

What is markup?

```
<center> Hi there </center>
\begin{center} Hi there again \end{center}

<h1> First Title </h1>
\section{First Title}
```

Markup allows separation between semantic and presentation.

A markup language

What is markup?

```
<center> Hi there </center>
\begin{center} Hi there again \end{center}

<h1> First Title </h1>
\section{First Title}
```

Markup allows separation between semantic and presentation.
You focuses merely on semantic.

A markup language

What is markup?

```
<center> Hi there </center>
\begin{center} Hi there again \end{center}

<h1> First Title </h1>
\section{First Title}
```

Markup allows separation between semantic and presentation.
But you need to learn a bit of presentation.

What's next?

Syntax and compilation process

First document

Paragraphs, hyphenation and spaces

Sections and table of content

Formatting and selecting font

Section 1

Syntax and compilation process

Markup in LaTeX

Two ways:

- commands: `\nameofcommands[opt1]{arg1}{arg2}`
- environments:

```
\begin{nameofenvironment}[opt1]{arg1}{arg2}
  influenced text
\end{nameofenvironment}
```

Special characters

\
{
}
%
#
$
^
~
&
_

Special characters

\	command
{	
}	
%	
#	
$	
^	
~	
&	
_	

Special characters

\	command	\textbackslash
{		
}		
%		
#		
$		
^		
~		
&		
_		

Special characters

\	command	\textbackslash
{	grouping	
}	grouping	
%		
#		
$		
^		
~		
&		
_		

Special characters

\	command	\textbackslash
{	grouping	\{
}	grouping	\}
%		
#		
$		
^		
~		
&		
_		

Special characters

\	command	\textbackslash
{	grouping	\{
}	grouping	\}
%	comment	
#		
$		
^		
~		
&		
_		

Special characters

\	command	\textbackslash
{	grouping	\{
}	grouping	\}
%	comment	\%
#		
$		
^		
~		
&		
_		

Special characters

\	command	\textbackslash
{	grouping	\{
}	grouping	\}
%	comment	\%
#		\#
$		\$
^		\textasciicircum
~		\textasciitilde
&		\&
_		_

How do I use LaTeX?

To compile a LaTeX document, one needs:

- A LaTeX distribution: TeX Live, MiKTeX Windows, MacTeX MacOS
- A text editor: Vi(m), Emacs, TeXmaker, TeXnicCenter, TeXWorks, Word

How do I use LaTeX?

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- A text editor: Vi(m), Emacs, TeXmaker, TeXnicCenter, TeXWorks, ~~Word~~ No, no, no and no!

How do I use LaTeX?

A distribution contains different engines:

- `latex` to produce DVI files;
- `dvi2ps` for PostScript files from DVI;
- `pdflatex` and `dvi2pdf` for PDF.

How do I use LaTeX?

A distribution contains different engines:

- `latex` to produce DVI files;
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- `pdflatex` and `dvi2pdf` for PDF.

```
latex    myfile.tex  ⟶  myfile.dvi
dvi2ps   myfile.dvi  ⟶  myfile.ps
ps2pdf   myfile.ps   ⟶  myfile.pdf

pdflatex myfile.tex  ⟶  myfile.pdf
pdf2ps   myfile.pdf  ⟶  myfile.ps
```

Section 2

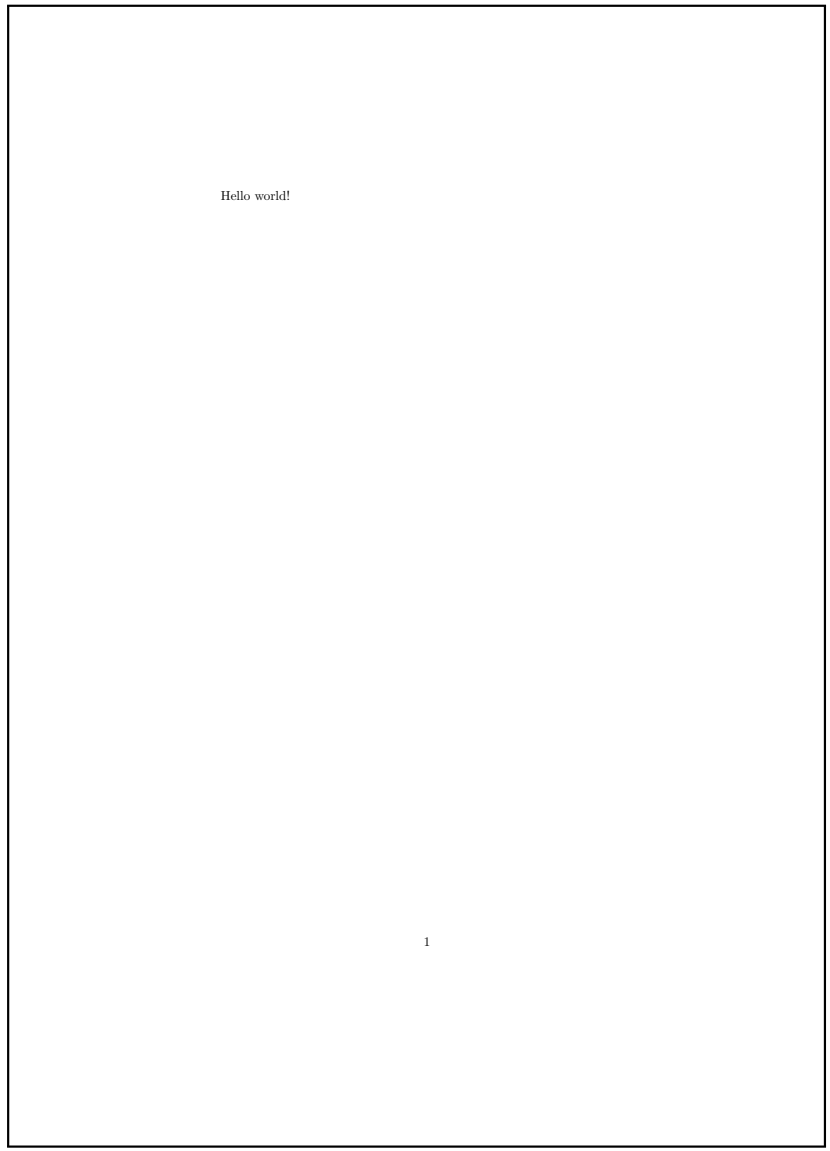
First document

```
\documentclass{article}

\begin{document}

 Hello world!

\end{document}
```

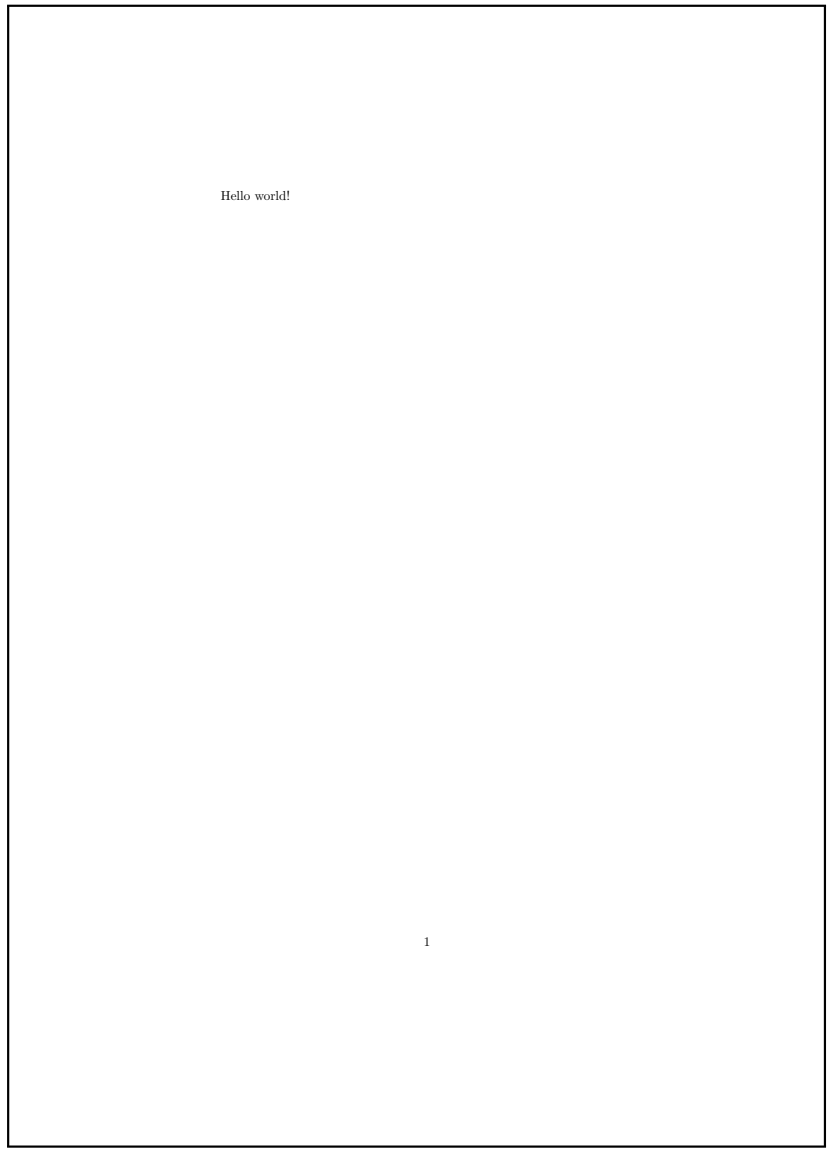


```
\documentclass{article}

\begin{document}

 Hello world!

\end{document}
```

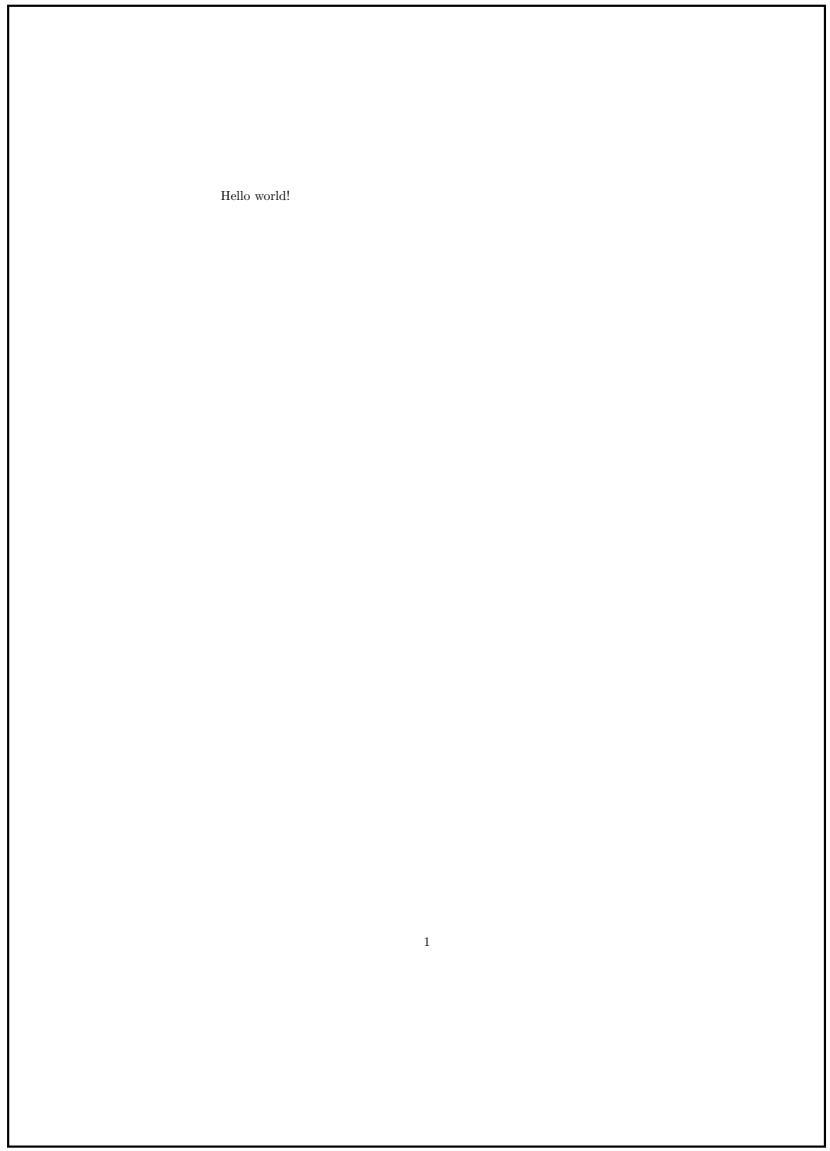


```
\documentclass{article}

\begin{document}

 Hello world!

\end{document}
```



Hello world!

Not that exciting...

```
\documentclass{article}

\title{My    first \LaTeX{}
document}
\author{Alexandre Labrosse}

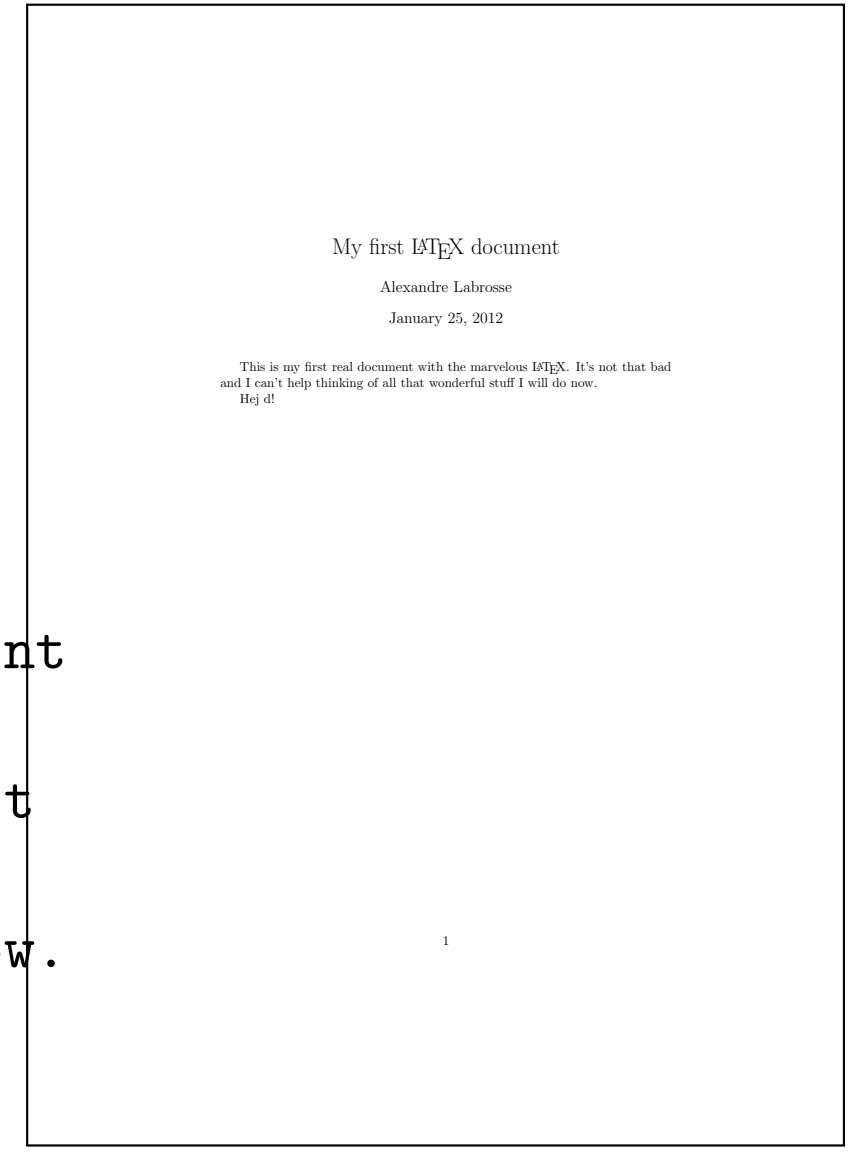
\begin{document}

\maketitle

This is my first real document
with the marvelous \LaTeX{}.
It's not that bad and I can't
help thinking of all that
wonderful stuff I will do now.

Hej då!

\end{document}
```



```
\documentclass{article}

\title{My␣␣␣␣first␣\LaTeX{}
document}
\author{Alexandre␣Labrosse}

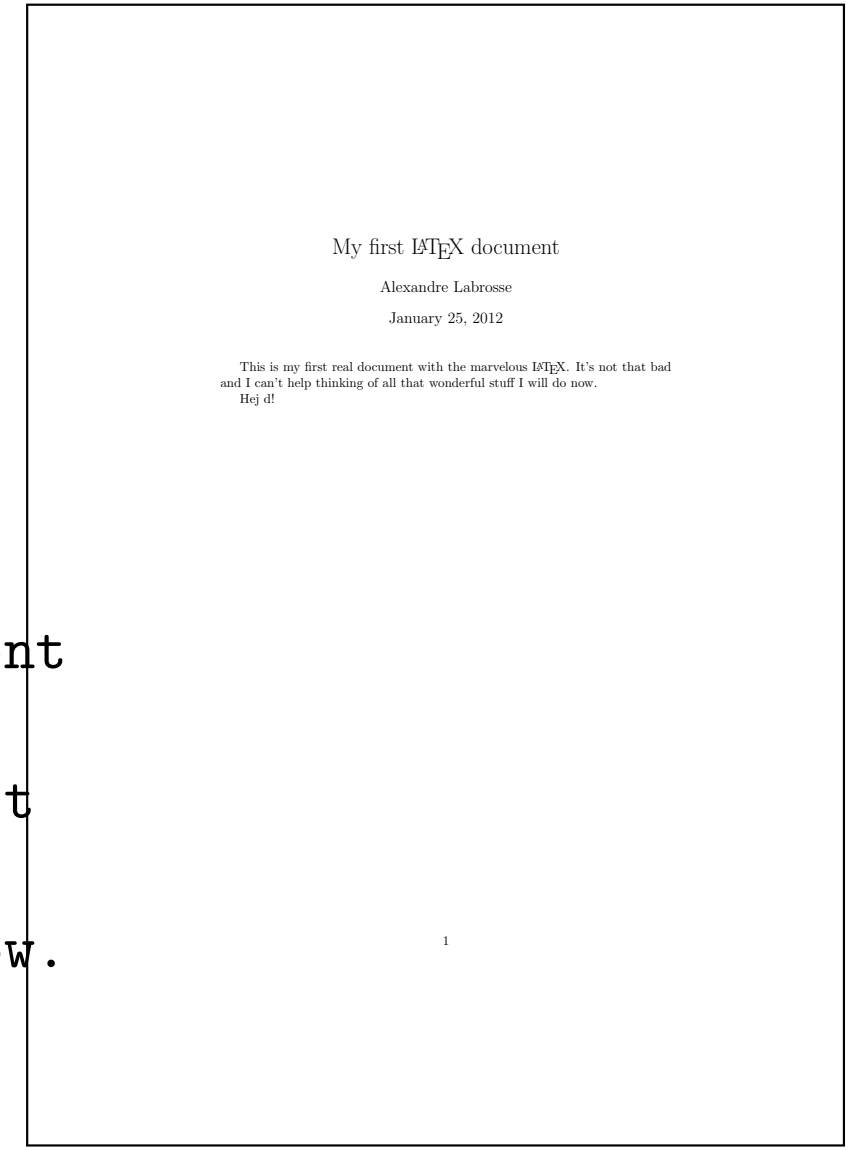
\begin{document}

\maketitle

This␣is␣my␣first␣real␣document
with␣the␣marvelous␣\LaTeX{}.
It's␣not␣that␣bad␣and␣I␣can't
help␣thinking␣of␣all␣that
wonderful␣stuff␣I␣will␣do␣now.

Hej␣då!

\end{document}
```



My first LaTeX document

Alexandre Labrosse

January 25, 2012

This is my first real document with the marvelous LaTeX. It's not that bad and I can't help thinking of all that wonderful stuff I will do now.

Hej d!

Alexandre

January

This is my first real document with
and I can't help thinking of all that wor
Hej d!

First package: `inputenc`

`\usepackage[…]{inputenc}`

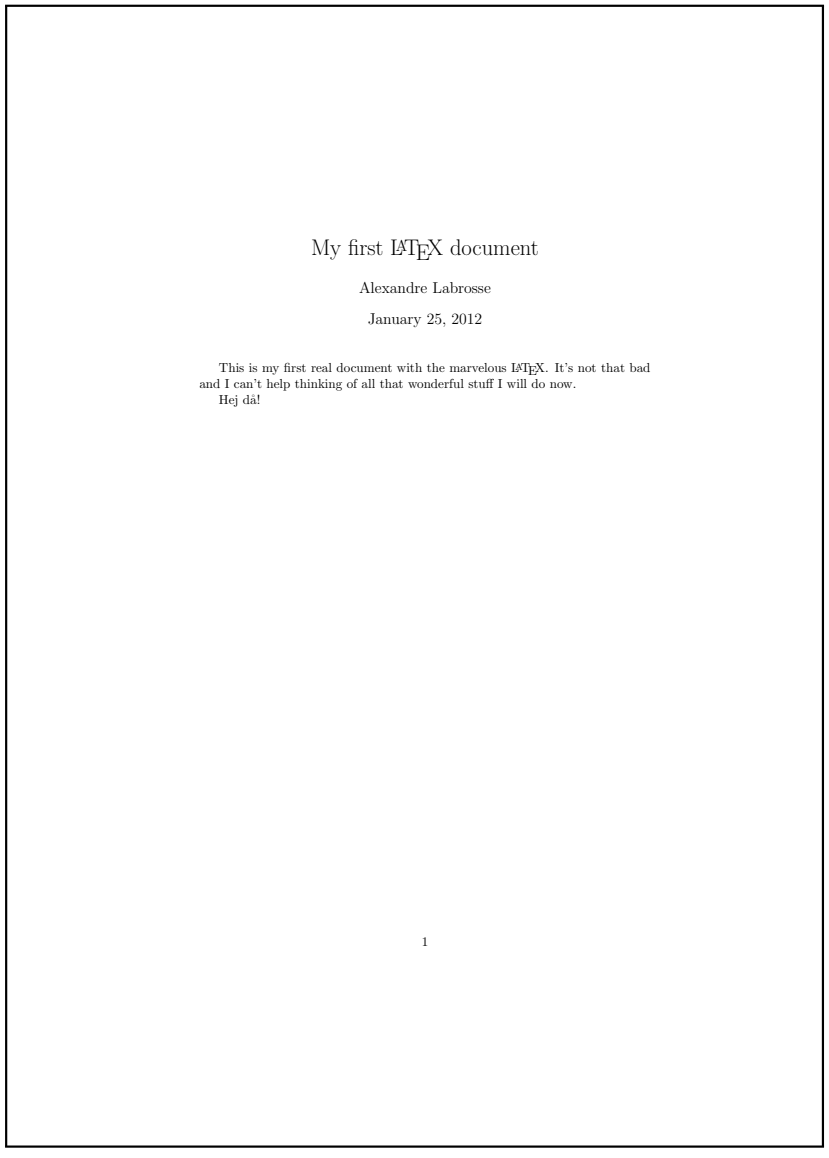
UTF-8	Unix, Linux, MacOS	`utf8, utf8x`
ISO-8859-1	Windows, Linux	`latin1`
ISO-8859-15	Windows, Linux	`latin9`
Applemac	MacOS	`applemac`

```
\documentclass{article}

\usepackage[utf8]{inputenc}
...
\begin{document}

...

\end{document}
```



My first LaTeX

Alexandre

January

This is my first real document with
and I can't help thinking of all that wor
Hej då!

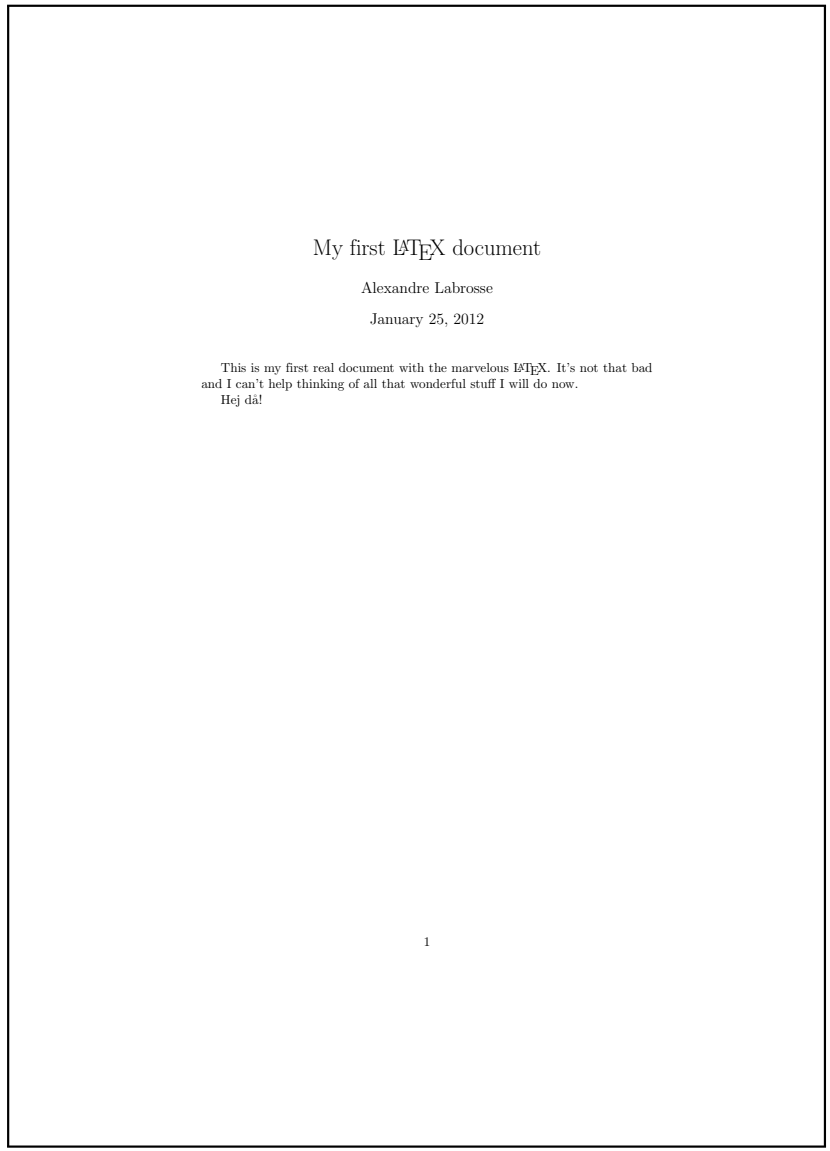
```
\documentclass{article}

\usepackage[utf8]{inputenc}

\title{My   f{}irst \LaTeX{}
document}
...
\begin{document}


...

\end{document}
```



My first LaTeX

Alexandre

January

This is my first real document with
and I can't help thinking of all that wor
Hej då!

A parenthesis about ligatures and punctuation

`--`	–	`\endash`
`---`	—	`\emdash`
`` ` ``	‘	`\quoteleft`
`'`	’	`\quoteright`
`` `` ``	“	`\quotedblleft`
`''`	”	`\quotedblright`
`,,`	„	`\quotedblbase`
`<<`	«	`\guillemotleft`
`>>`	»	`\guillemotright`
`!` `` ` ``	¡	`\textexclamdown`
`?` `` ` ``	¿	`\textquestiondown`

Sounds good…

But what if no such character on my keyboard?

Accents

\`o	ò
\'o	ó
\^o	ô
\"o	ö
\H{o}	ő
\~o	õ
\c{o}	o̧
\k{o}	ǫ
\l	ł
\=o	ō
\b{o}	o̲
\.o	ȯ
\d{o}	ọ
\r{o}	o̊
\u{o}	ŏ
\v{o}	ǒ
\t{oo}	o͡o

Accents

\`o	ò
\'o	ó
\^o	ô
\"o	ö
\H{o}	ő
\~o	õ
\c{c}	ç
\k{a}	ą
\l	ł
\=o	ō
\b{o}	o̲
\.o	ȯ
\d{u}	ụ
\r{a}	å
\u{o}	ŏ
\v{s}	š
\t{oo}	o͡o

Let's get a "circumflex i"

```
\^i    \i
```

Recommended preamble

```
\documentclass[a4paper]{article}

\usepackage[...]{inputenc}
```

Recommended preamble

```
\documentclass[a4paper]{article}

\usepackage[...]{inputenc}
\usepackage[T1]{fontenc}
```

Recommended preamble

```
\documentclass[a4paper]{article}

\usepackage[…]{inputenc}
\usepackage[T1]{fontenc}

\usepackage[english,swedish]{babel}
```

Recommended preamble

```
\documentclass[a4paper]{article}

\usepackage[…]{inputenc}
\usepackage[T1]{fontenc}

\usepackage[english,swedish]{babel}

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

Other document classes

```
\documentclass[opt1,opt2,...]{classname}
```

- minimal
- article, ieeetrans, proc
- report, book, memoir
- beamer
- letter

Common options of document class

```
\documentclass[opt1,opt2,...]{classname}
```

- 10pt, 11pt, 12pt
- a4paper, letterpaper, a5paper, ...
- titlepage, notitlepage
- onecolumn, twocolumn
- landscape
- oneside, twoside
- openright, openany
- draft

Section 3

Paragraphs, hyphenation and spaces

Example

```
This is a sufficiently long text that need to be typesettec
otherwise it would go beyond the right margin and the right
```

This is a sufficiently long text that need to be typesetted over multiple lines otherwise it would go beyond the right margin and the right side of the screen.

Example

```
This is a sufficiently long text that need to be typesette
otherwise it would go beyond the right margin and the righ

I decide to start a new paragraph to show indentation. Thi
a not so long word that, very sadly, won't break: monospac
```

This is a sufficiently long text that need to be typesetted over multiple lines otherwise it would go beyond the right margin and the right side of the screen.

I decide to start a new paragraph to show indentation. This paragraph contains a not so long word that, very sadly, won't break: monospace.

Example

```
\documentclass[draft]{...}

This is a sufficiently long text that need to be typesette
otherwise it would go beyond the right margin and the righ

I decide to start a new paragraph to show indentation. Thi
a not so long word that, very sadly, won't break: monospac
```

This is a sufficiently long text that need to be typesetted over multiple lines otherwise it would go beyond the right margin and the right side of the screen.

I decide to start a new paragraph to show indentation. This paragraph contains a not so long word that, very sadly, won't break: monospace.

A first solution

```
I decide to start a new paragraph to show indentation. This
a not so long word that, very sadly, won't break:\\ monospa
```

I decide to start a new paragraph to show indentation. This paragraph contains a not so long word that, very sadly, won't break:
monospace.

A first solution

```
I decide to start a new paragraph to show indentation. This
a not so long word that, very sadly, won't break:\\ monospa
```

I decide to start a new paragraph to show indentation. This paragraph contains a not so long word that, very sadly, won't break:
monospace.

A second solution

```
I decide to start a new paragraph to show indentation. This
a not so long word that, very sadly, won't break:
\linebreak[2] monospace.
```

I decide to start a new paragraph to show indentation. This paragraph contains a not so long word that, very sadly, won't break: monospace.

A second solution

```
I decide to start a new paragraph to show indentation. This
a not so long word that, very sadly, won't break:
\linebreak[4] monospace.
```

I decide to start a new paragraph to show indentation. This paragraph contains a not so long word that, very sadly, won’t break: monospace.

The best solution

```
\hyphenation{mono-space}

I decide to start a new paragraph to show indentation. This
a not so long word that, very sadly, won't break: monospace
```

I decide to start a new paragraph to show indentation. This paragraph contains a not so long word that, very sadly, won't break: monospace.

Other problems

- Keeping things on the same line
- Adding more than one space

Other problems

- Keeping things on the same line
- Adding more than one space

Keeping things together

You might encounter two different solutions:

- making a big box with `\mbox`,
- inserting an unbreakable space.

\mbox is suitable for a kind of word

```
For example, if I ever need to typeset a swedish
phone number: 08 -- 736 86 95
```

For example, if I ever need to typeset a swedish phone number: 08 – 736 86 95

\mbox is suitable for a kind of word

```
For example, if I ever need to typeset a swedish
phone number: \mbox{08 -- 736 86 95}
```

For example, if I ever need to typeset a swedish phone number: 08 – 736 86 95

The unbreakable space joins two different words

```
For example, if now I want to talk about this very
well-known Mr SoAndSo.
```

For example, if now I want to talk about this very well-known Mr SoAndSo.

The unbreakable space joins two different words

```
For example, if now I want to talk about this very
well-known Mr~SoAndSo.
```

For example, if now I want to talk about this very well-known Mr SoAndSo.

Other problems

- Keeping things on the same line
- Adding more than one space

Other problems

- Keeping things on the same line
- Adding more than one space

Spaces

```
\␣
```

```
\hspace{length}
\hspace*{length}
```

```
\vspace{length}
\vspace*{length}
```

Lengths

$$\langle length \rangle = \langle number \rangle . \langle number \rangle \langle unit \rangle$$

Lengths

$$\langle length \rangle = \langle number \rangle . \langle number \rangle \langle unit \rangle$$

`pt`	a point	1 pt
`mm`	a millimeter	2.84 pt
`cm`	a centimer	28.4 pt
`in`	an inch	72.27 pt
`em`	an em, roughly the width of 'M'	
`ex`	an ex, roughly the height of 'x'	

Lengths

$$\langle length \rangle = \langle number \rangle . \langle number \rangle \langle unit \rangle$$

`pt`	a point	1 pt
`mm`	a millimeter	2.84 pt
`cm`	a centimer	28.4 pt
`in`	an inch	72.27 pt
`em`	an em, roughly the width of 'M'	
`ex`	an ex, roughly the height of 'x'	

`\stretch{1}` an elastic length

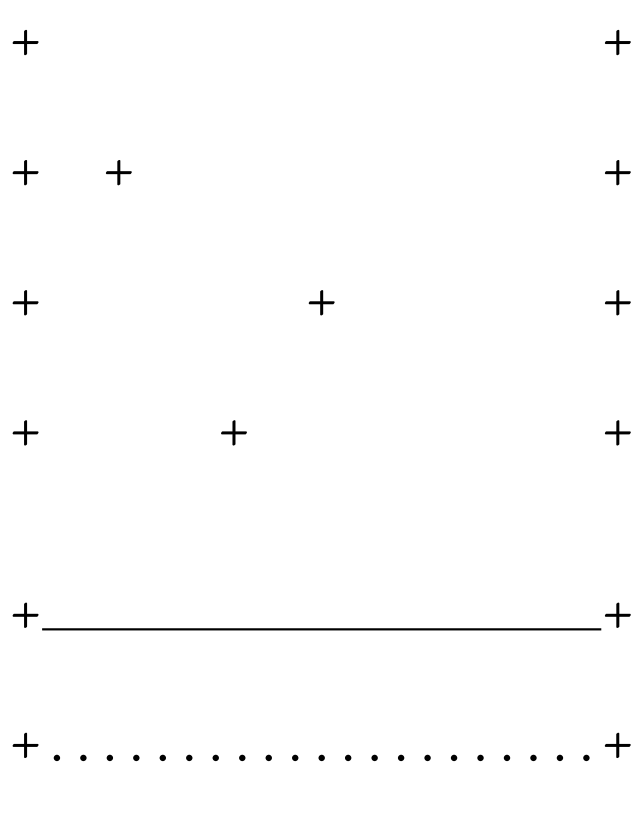
Predefined spaces

`\enspace`	⊢⊣	`\hspace{.5em}`
`\quad`	⊢—⊣	`\hspace{1em}`
`\qquad`	⊢——⊣	`\hspace{2em}`

`\smallskip`	⌶	`\vspace{\smallskipamount}`
`\medskip`	I	`\vspace{\medskipamount}`
`\bigskip`	I	`\vspace{\bigskipamount}`

Elastic spaces

```
+\hfill+
+\hspace{1em}+\hfill+
+\hfill+\hfill+
+\hspace{\stretch{1}}%
+\hspace{\stretch{2}}+
+\hrulefill+
+\dotfill+
```



Anything else than justifying?

	This is a short example for testing alignment.
`flushleft`	This is a short example for testing alignment.
`flushright`	This is a short example for testing alignment.
`center`	This is a short example for testing alignment.

Section 4

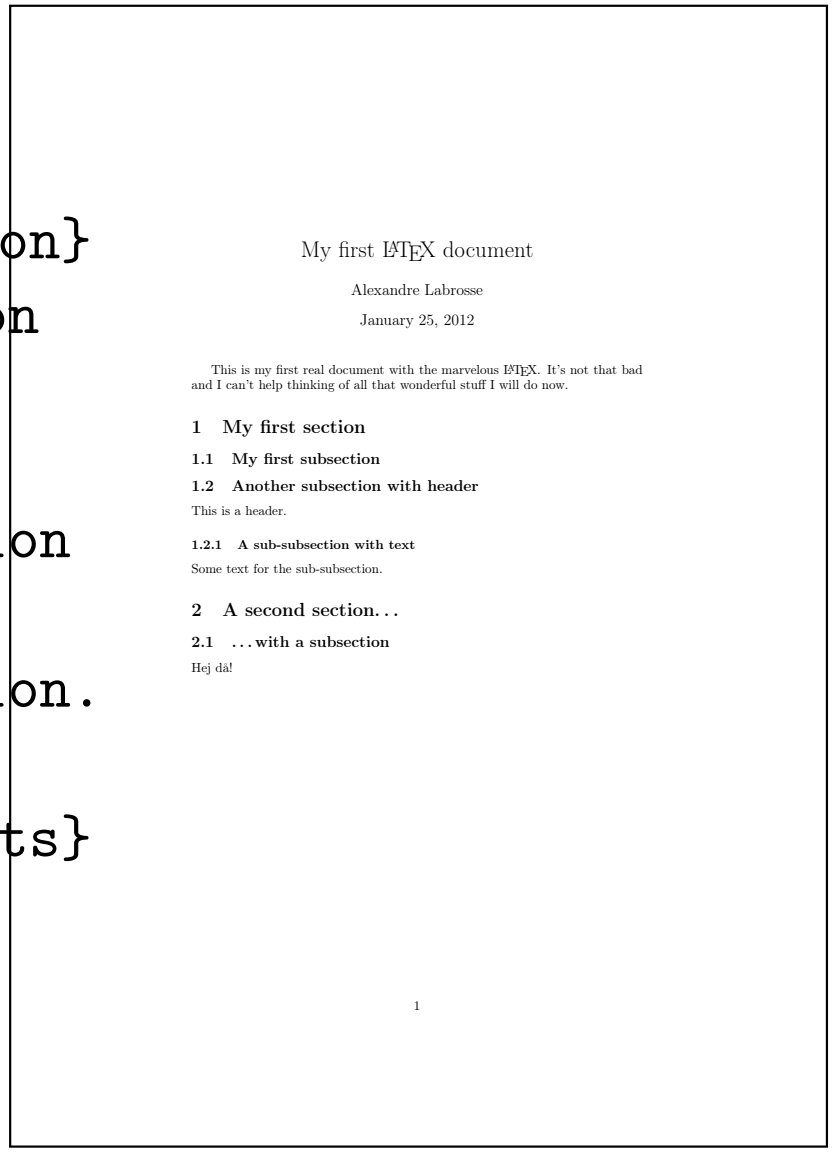
Sections and table of content

Up to 7 sectioning levels

level	document class	command
-1	book and report	\part
0	article	\part
0	book and report	\chapter
1	all	\section
2	all	\subsection
3	all	\subsubsection
4	all	\paragraph
5	all	\subparagraph

```
\section{My first section}
\subsection{My first subsection}
\subsection{Another subsection
with header}
This is a header.
\subsubsection{A sub-subsection
with text}
Some text for the sub-subsection.

\section{A second section\ldots}
\subsection{\ldots with a
subsection}
```



My first LaTeX document

Alexandre Labrosse

January 25, 2012

This is my first real document with the marvelous LaTeX. It's not that bad and I can't help thinking of all that wonderful stuff I will do now.

1 My first section

1.1 My first subsection

1.2 Another subsection with header

This is a header.

1.2.1 A sub-subsection with text

Some text for the sub-subsection.

2 A second section...

2.1 ...with a subsection

Hej då!

1

This is my first real document with the marvelous LaTeX. It's not th
and I can't help thinking of all that wonderful stuff I will do now.

1 My first section

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Some text for the sub-subsection.

2 A second section...

2.1 ...with a subsection

Hej då!

And how I change the style of those titles?

.

And how I change the style of those titles?

See the *LaTeX Companion* and `\@startsection`.

```
\tableofcontents
```

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Contents

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1.2 Another subsection with header

This is a header.

1.2.1 A sub-subsection with text

```
\setcounter{tocdepth}{2}
\tableofcontents
```

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This is a header.

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Some text for the sub-subsection.

2 A second section. . .

2.1 . . . with a subsection

Hej då!

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Contents

1 My first section

1.1 My first subsection

1.2 Another subsection with header

This is a header.

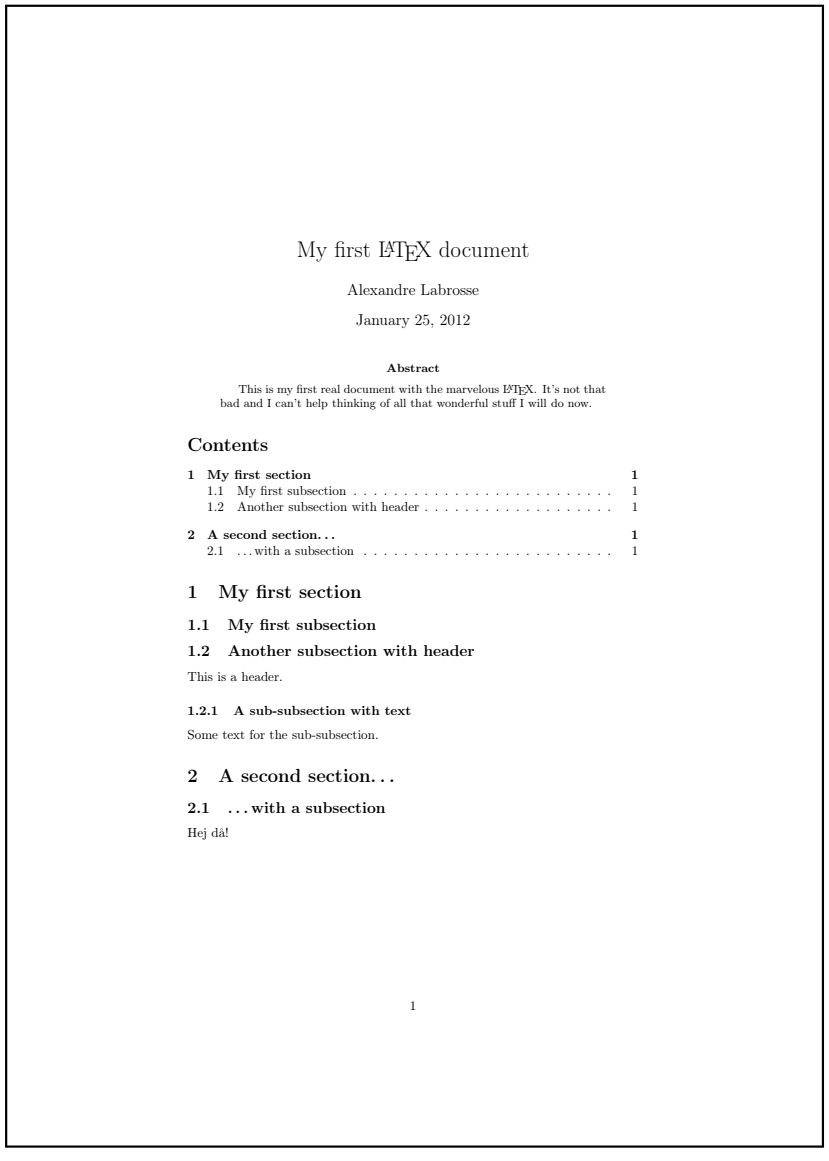
1.2.1 A sub-subsection with text

Some text for the sub-subsection.

```
\begin{abstract}

...

\end{abstract}
```



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Alexandre Labrosse

January 25, 2012

Abstract

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This is a header.

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Some text for the sub-subsection.

2 A second section...

2.1 ...with a subsection

Hej då!

Abstract

This is my first real document with the marvelous LaTeX. It's not that bad and I can't help thinking of all that wonderful stuff I will do now.

Contents

1 My first section

1.1 My first subsection

1.2 Another subsection with header

This is a header.

1.2.1 A sub-subsection with text

References

```
\section{Section} \label{here}

Doing a reference is made like this: see
section~\ref{here} on page~\pageref{here}.
```

3 Section

Doing a reference is made like this: see section 3 on page 13.

References

```
\section{Section} \label{here}

Doing a reference is made like this: see
section~\ref{here} on page~\pageref{here}.
```

3 Section

Doing a reference is made like this: see section 3 on page 13.

⚠ References need
2 compilations.

Footnotes

```
When you need to precise something\footnote{Like this.}
you can use the \verb|\footnote| command.
```

When you need to precise something[1] you can use the `\footnote` command.

[1] Like this.

Section 5

Formatting and selecting font

Changing style

Command	Environment	Result
`\textrm{…}`	`{\rmfamily …}`	This is roman family.
`\textsf{…}`	`{\sffamily …}`	Text is sans-serif.
`\texttt{…}`	`{\ttfamily …}`	Text is `monospaced`.
`\textmd{…}`	`{\mdseries …}`	Text is medium.
`\textbf{…}`	`{\bfseries …}`	Text is **bold faced**.
`\textup{…}`	`{\upshape …}`	Text is up-and-down.
`\textit{…}`	`{\itshape …}`	Text is *italicized*.
`\textsc{…}`	`{\scshape …}`	Text with Small Capitals.
`\textnormal{…}`	`{\normalfont …}`	Default font of the document.

Emphasising

```
Emphasising things is \emph{very \emph{very} easy}
and far more powerful than using \verb+\textit+.
```

Empasising things is *very* very *easy* and far more powerful than using `\textit`.

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```

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Changing size

\tiny Size
\scriptsize Size
\footnotesize Size
\small Size
\normalsize Size
\large Size
\Large Size
\LARGE Size
\huge Size
\Huge Size

```
Here is a {\Huge big} word.
```

Here is a big word.

Defining commands and environment

Why would I want to define commands?

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- To keep the separation between syntax and semantic.

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Defining commands and environment

Why would I want to define commands?

- To keep the separation between syntax and semantic.
- Further modifications of style are easier.
- Commands may be easier to remember or quicker to typeset.

Defining commands and environment

```
\newcommand{cmd}[nargs]{definition}
```

```
\newcommand{\KTH}{%
    Kungliga Tekniska Högskolan,
    \textit{Royal Institute of Technology}}

Your school is KTH (\KTH) and it's great!
```

Your school is KTH (Kungliga Tekniska Högskolan, *Royal Institute of Technology*) and it's great!

A bad example...

```
\newcommand{\note}[1]{\tiny #1}

This is more important \note{than that}.
This is also important.
```

A bad example...

```
\newcommand{\note}[1]{\tiny #1}

This is more important \note{than that}.
This is also important.
```

This is more important than that. This is also important.

...with correction.

```
\newcommand{\note}[1]{{\tiny #1}}

This is more important \note{than that}.
This is also important.
```

This is more important than that. This is also important.

And now, an environment

```
\newenvironment{cmd}[args]{begin}{end}


\newenvironment{Abstract}
{\begin{center}\normalfont\bfseries Abstract\end{center}
 \begin{quote}}
{\end{quote}\par}

\begin{Abstract}
  This abstract explains basics about building new
  environments and eventually presents a new
  environment called {\tt quote}.
\end{Abstract}
Some text after the abstract to deal with the issue.
Maybe some more text if needed.  Is it enough?
```

And now, an environment

Abstract

This abstract explains basics about building new environments and eventually presents a new environment called `quote`.

Some text after the abstract to deal with the issue. Maybe some more text if needed. Is it enough?

It's over for today, and next week?

- bibliography
- formulae and alignment
- arrays and tables

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