

Introduction to Programming and Computing for Scientists

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Tutorial 2a: writing a document using LaTeX

You need a text editor and a LaTeX distribution

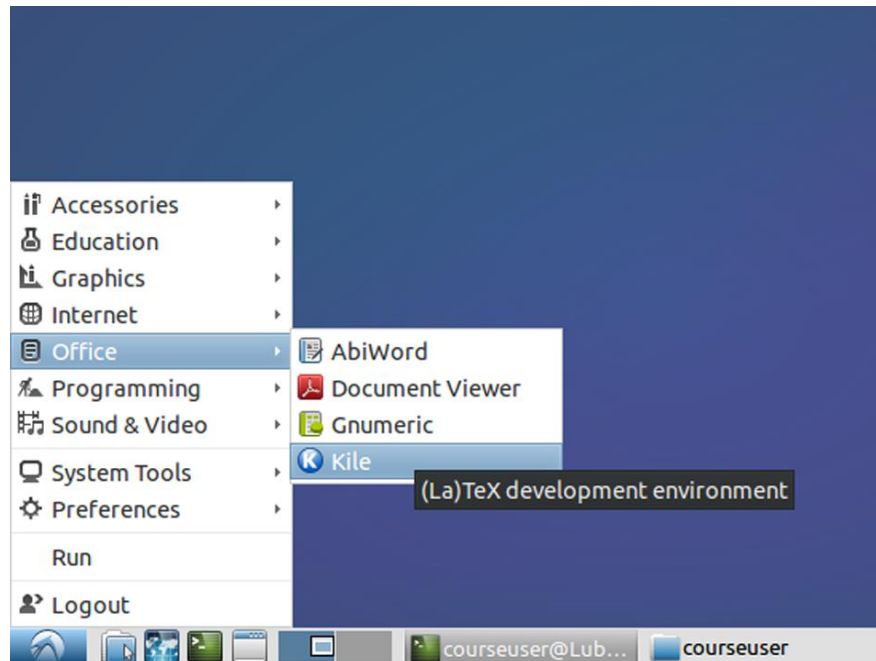
- LaTeX files are simple ASCII files, like any program code
- They can be edited on any platform (Linux, Windows, anything) using any text editor
- These days everybody prefers to have the result in PDF
 - This was not the case 20 years ago, so by default LaTeX produces DVI files
 - All modern LaTeX systems can build PDF as well (**pdf~~l~~atex** command in Linux)
- There are different LaTeX distributions, all based on the same LaTeX2e version

Platform	LaTeX distribution
Ubuntu, Debian	texlive , texlive-base , texlive-full
RedHat, CentOS, Fedora, SuSE	texlive , texlive-base , texlive-latex
Linux	tetex – <i>not supported since 2006</i>
Windows	MiKTeX
Mac OS	MacTeX

- There are many packages not included in the typical distributions, but they always can be added later

Highly recommended way: use a LaTeX IDE

- LaTeX IDEs can:
 - Edit the text, highlighting elements and environments
 - Assist in typing the environments and tags
 - Offer menus for most common environments, tags, symbols etc
 - Offer single-click interface to build and view LaTeX files
- Many such IDEs exist, today we will use **Kile**
 - Find it in the menu, or type **kile** in “Run”



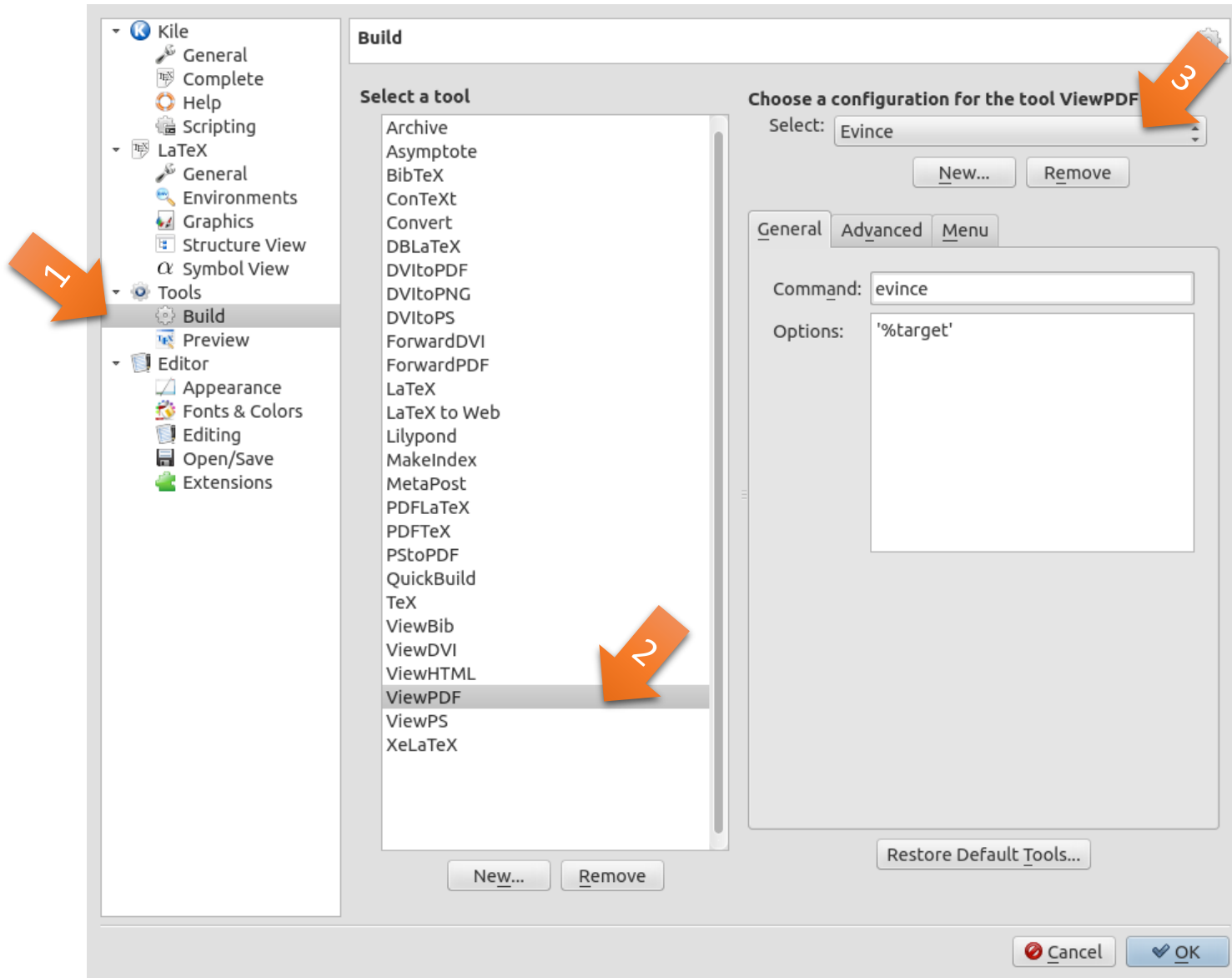
Configure your Kile



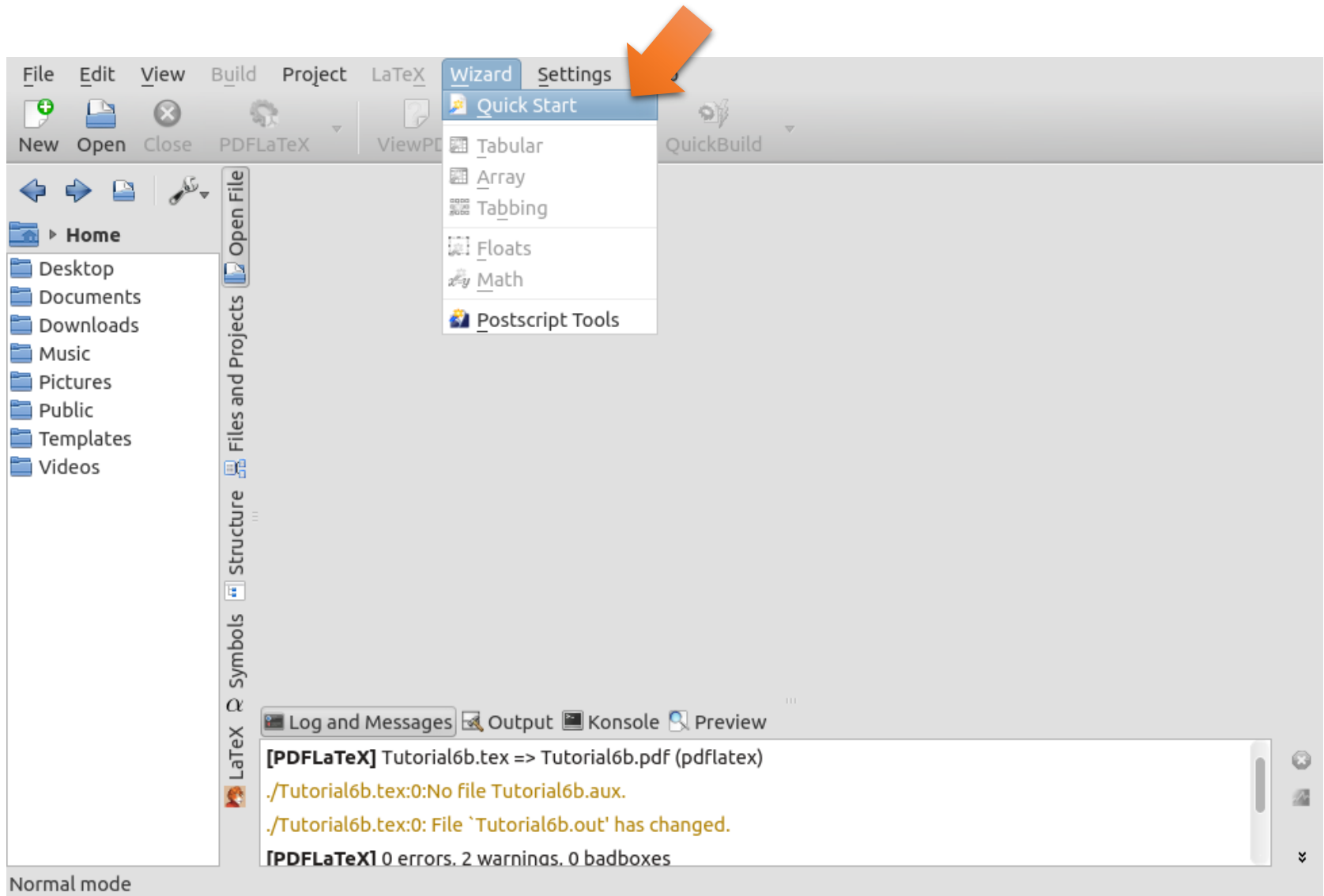
The screenshot shows the Kile application interface. The menu bar includes File, Edit, View, Build, Project, LaTeX, Wizard, Settings, and Help. The Settings menu is open, showing options such as 'Define Current Document as 'Master Document'', 'System Check...', 'Toolbars Shown', 'Show Statusbar', 'Show Side Bar', 'Show Messages Bar', 'Full Screen Mode' (with keyboard shortcut Ctrl+Shift+F), 'Configure Shortcuts...', 'Configure Toolbars...', and 'Configure Kile...'. The 'Configure Kile...' option is highlighted. The left sidebar shows a file explorer with 'Home' selected, containing folders like Desktop, Documents, Downloads, Music, Pictures, Public, Templates, and Videos. The bottom status bar indicates 'Normal mode'. The bottom panel shows the LaTeX log output for 'Tutorial6b.tex'.

```
[PDFLaTeX] Tutorial6b.tex => Tutorial6b.pdf (pdflatex)
./Tutorial6b.tex:0:No file Tutorial6b.aux.
./Tutorial6b.tex:0: File `Tutorial6b.out' has changed.
[PDFLaTeX] 0 errors. 2 warnings. 0 badboxes
```

Configure your Kile: select Evince as PDF viewer

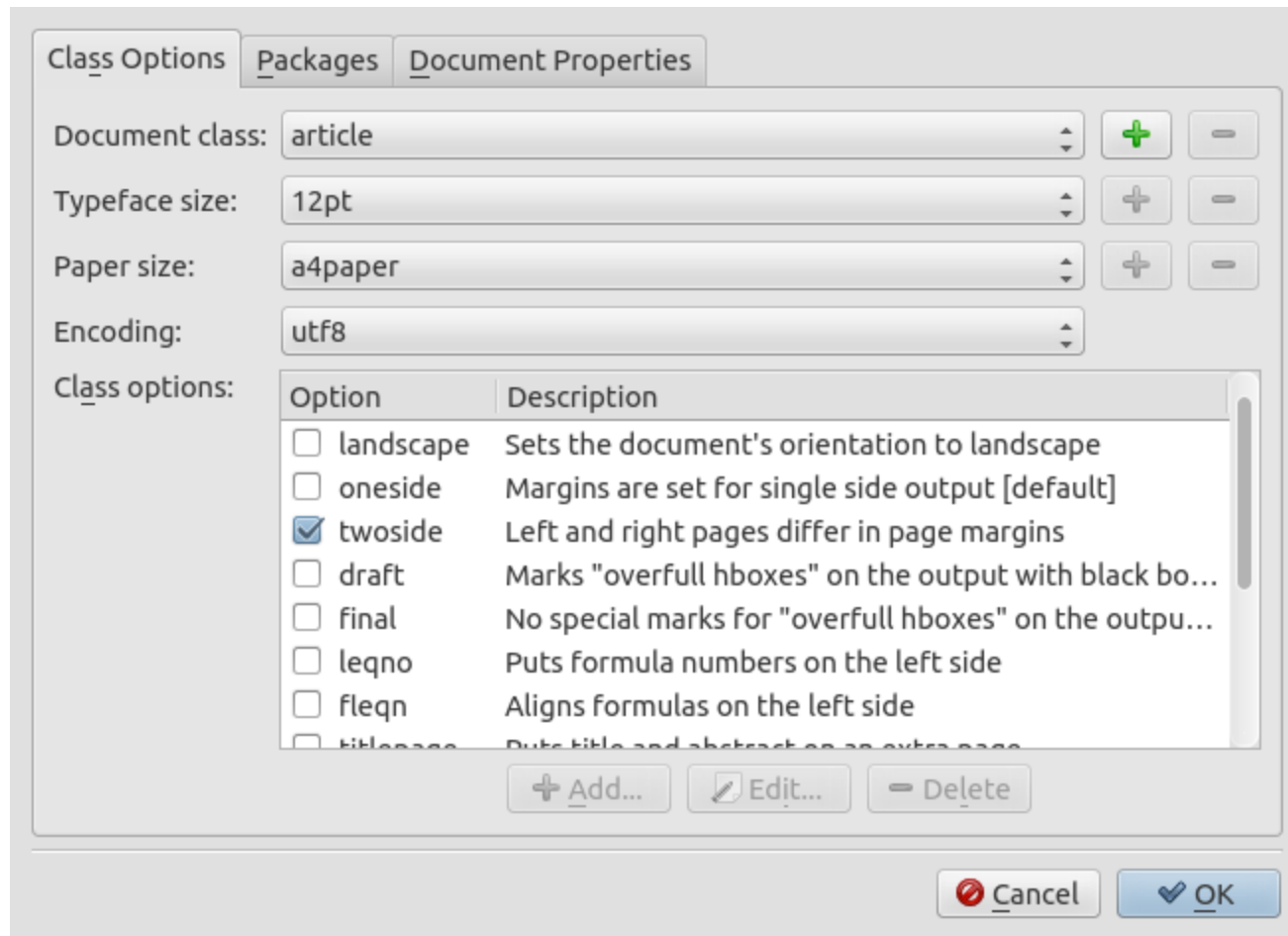


Quick-start the new document using Kile Wizard



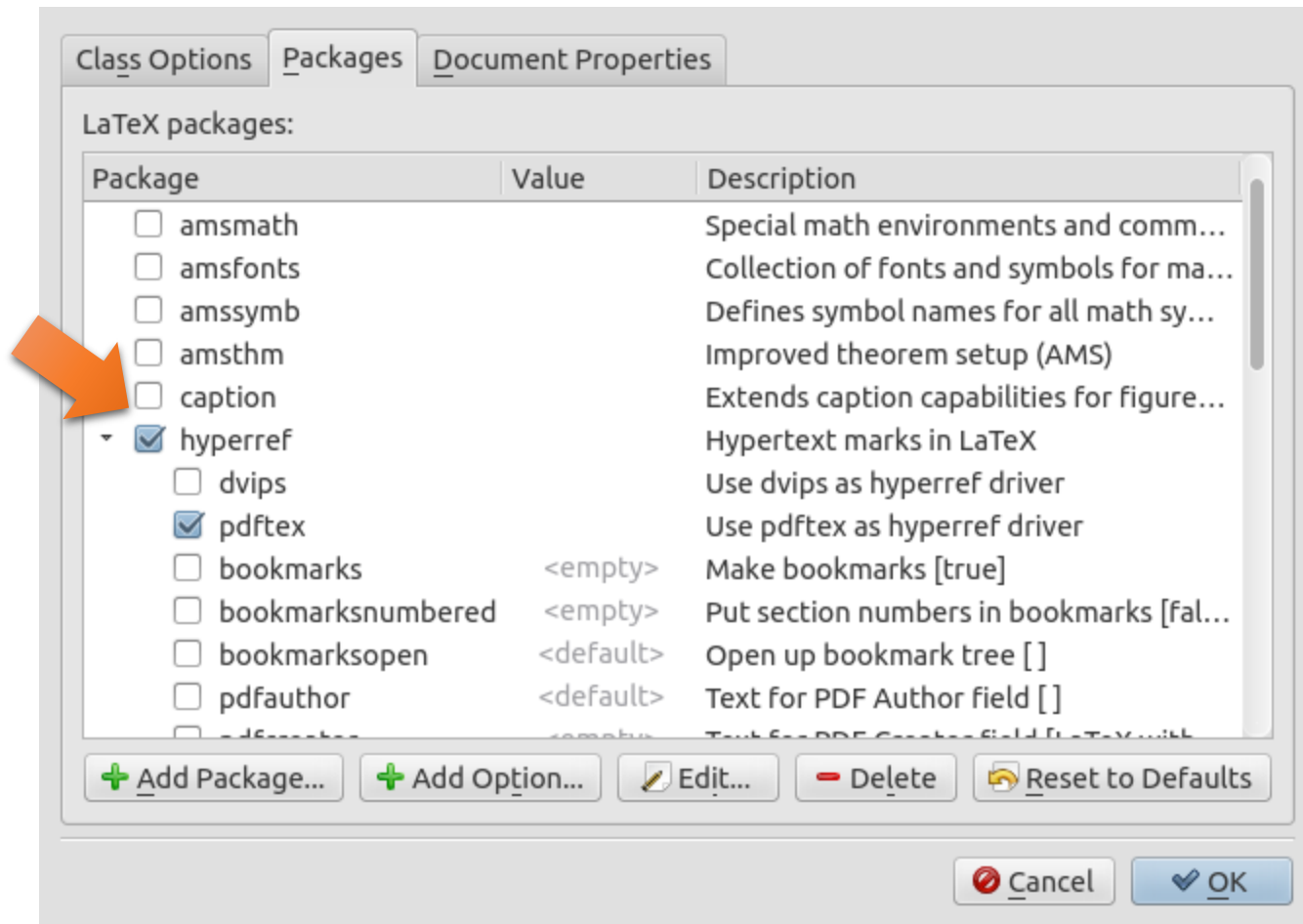
We will make an article for a two-sided A4 printing

Don't click OK yet, let's go to the Packages tab



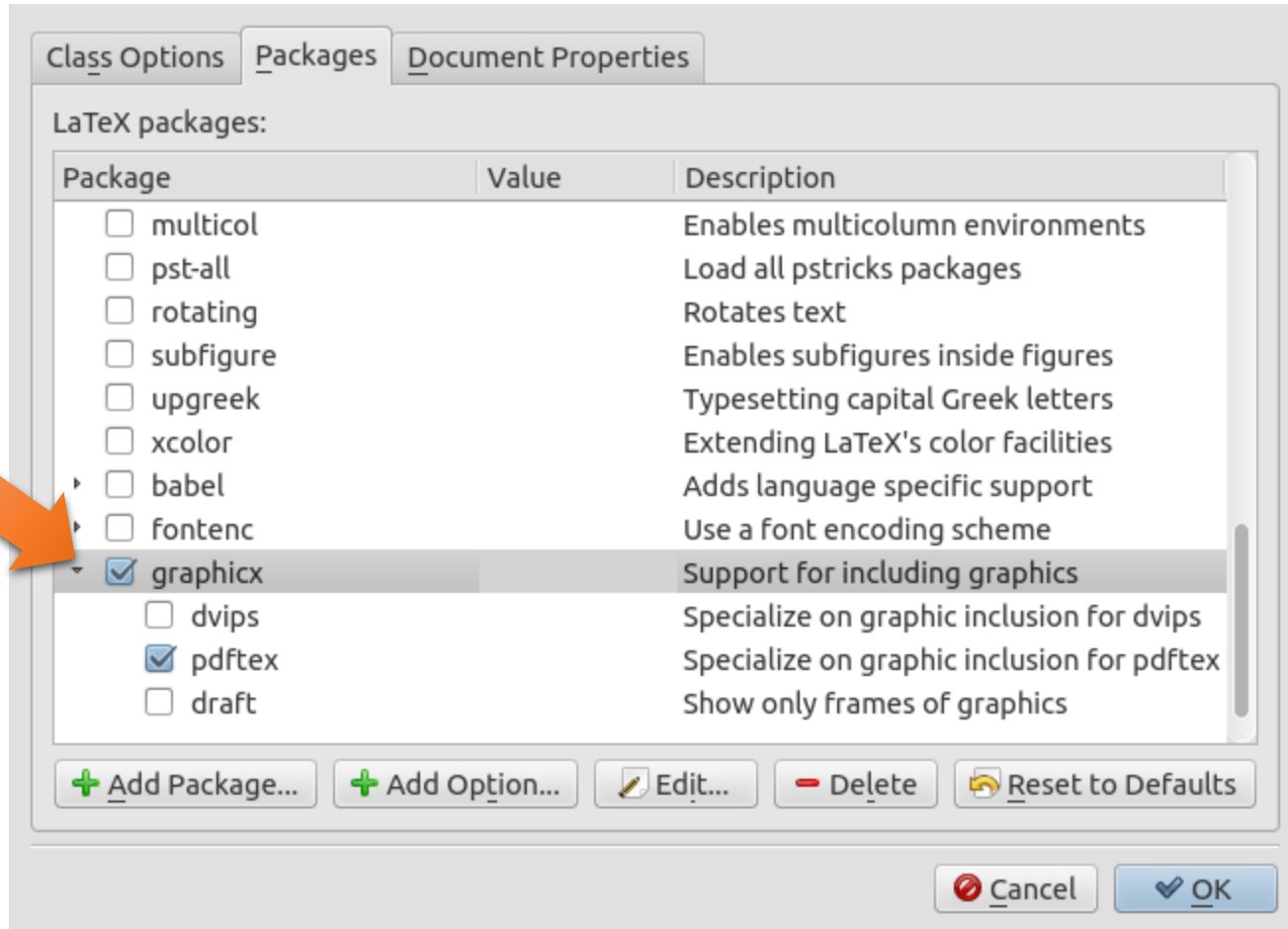
Let's pick some useful LaTeX packages

hyperref with **pdftex** will make PDF files with clickable cross-references

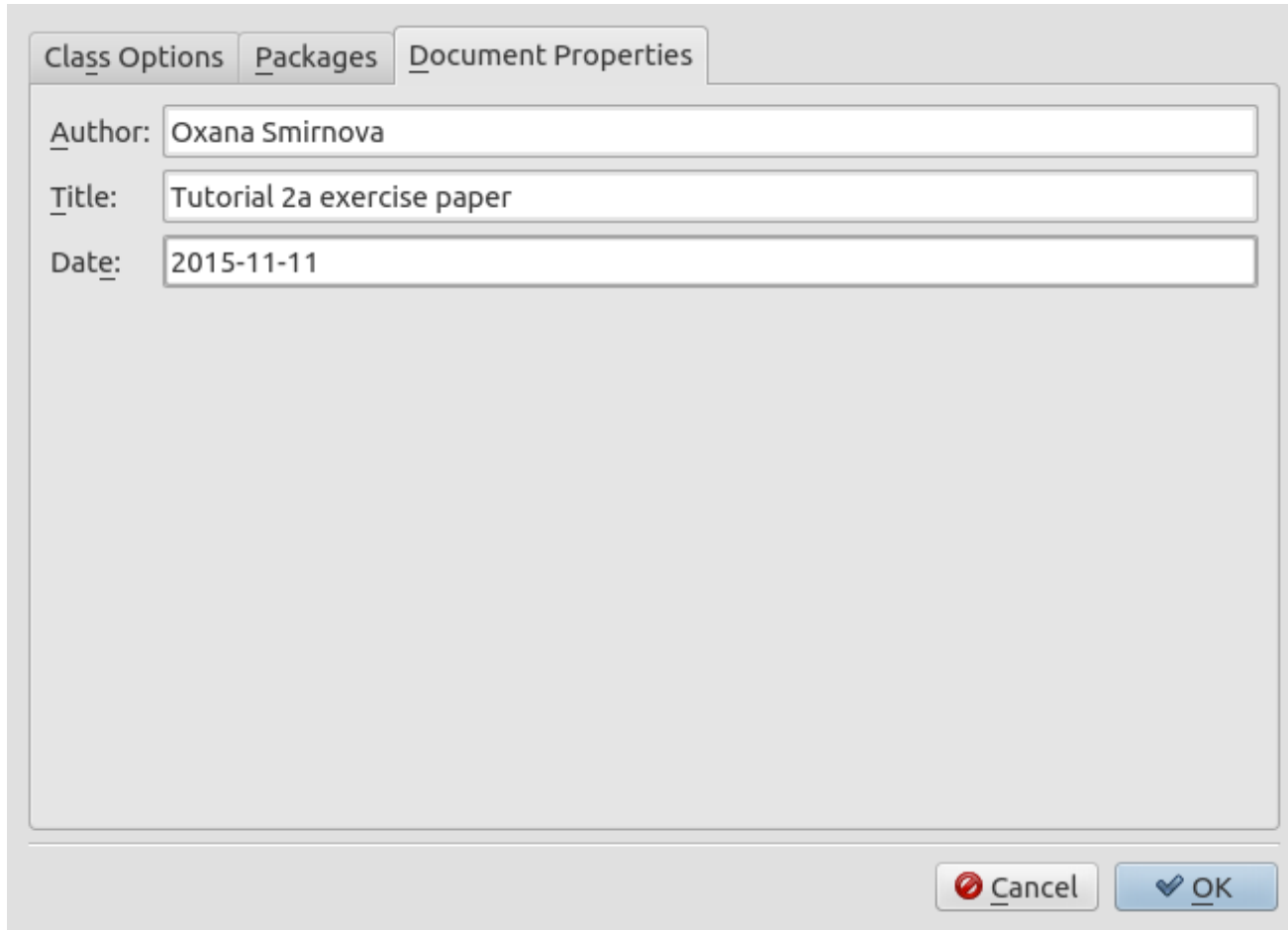


More useful packages

graphicx with **pdftex** will allow to insert raster graphics (JPG, PNG etc)



And now some metadata



The image shows a dialog box titled 'Document Properties' with three tabs: 'Class Options', 'Packages', and 'Document Properties'. The 'Document Properties' tab is active. It contains three text input fields: 'Author:' with the value 'Oxana Smirnova', 'Title:' with the value 'Tutorial 2a exercise paper', and 'Date:' with the value '2015-11-11'. At the bottom right, there are two buttons: 'Cancel' (with a red prohibition icon) and 'OK' (with a blue checkmark icon).

Now it is OK to click OK

Time to save the file

The screenshot shows a LaTeX editor interface with the following components:

- Toolbar:** File, Edit, View, Build, Project, LaTeX, Bookmarks, Tools, Settings, Help. Action buttons: New, Open, Close, Save, Save As (highlighted with an orange arrow), Undo, Redo, PDFLaTeX, ViewHTML, Convert.
- Editor Window:** Untitled x. Contains LaTeX source code:

```
\documentclass[a4paper, 12pt]{article}

\usepackage{ucs}
\usepackage[utf8]{inputenc}
\usepackage{babel}
\usepackage{fontenc}
\usepackage[pdftex]{graphicx}

\usepackage[pdftex]{hyperref}

\author{Oxana Smirnova}
\title{Tutorial 2a exercise paper}
\date{2015-11-11}

\begin{document}

\end{document}
```
- Save As Dialog:** Places: Home, Network, Root, Trash, dav, 28,5 GiB...; Home > Documents; images; Name: Tutorial2a.tex; Filter: (La)TeX Source Files; Encoding: UTF-8; Automatically select filename extension (.tex) checked; Save, Cancel buttons.
- Bottom Bar:** Normal mode; Line: 16 Col: 2 INS LINE

And now let's build it

The screenshot shows a LaTeX editor interface with the following components:

- Menu Bar:** File, Edit, View, Build, Project, LaTeX, Wizard, Bookmarks, Tools, Settings, Help.
- Toolbar:** New, Open, Close, Save, Save As, Undo, Redo, PDFLaTeX (highlighted with an orange arrow), ViewHTML, Convert.
- Editor Window:** Tutorial2a.tex. The code is:

```
\documentclass[a4paper,12pt,twoside]{article}

\usepackage{ucs}
\usepackage[utf8]{inputenc}
\usepackage{babel}
\usepackage{fontenc}
\usepackage[pdftex]{graphicx}

\usepackage[pdftex]{hyperref}

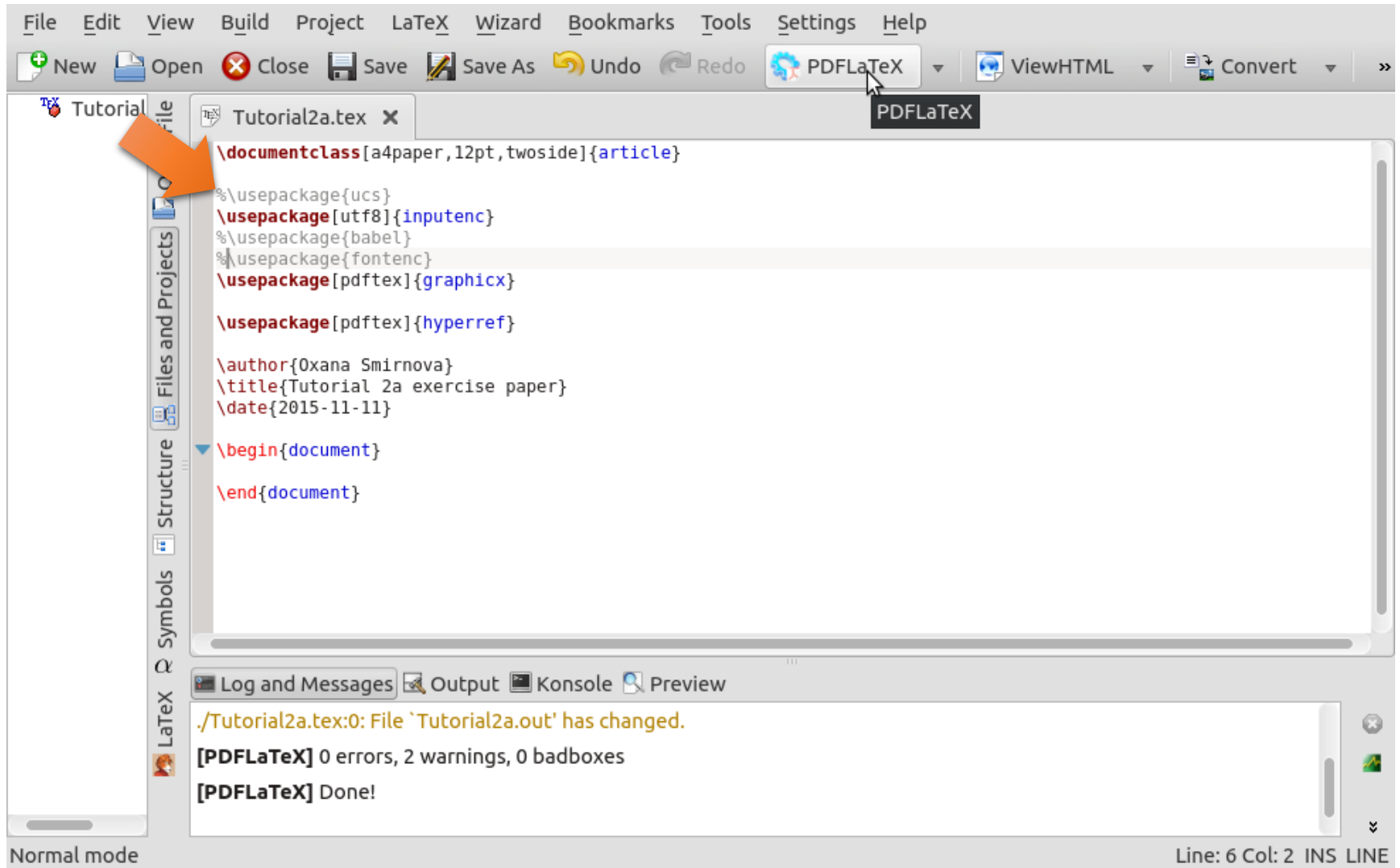
\author{Oxana Smirnova}
\title{Tutorial 2a exercise paper}
\date{2015-11-11}

\begin{document}
|
\end{document}
```
- Log and Messages Window:**

```
[PDFLaTeX] finished with exit code 1
./Tutorial2a.tex:4:File `ucs.sty' not found. \usepackage
[PDFLaTeX] 1 error, 0 warnings, 0 badboxes
```
- Bottom Bar:** Normal mode (left), Line: 16 Col: 2 INS LINE (right).

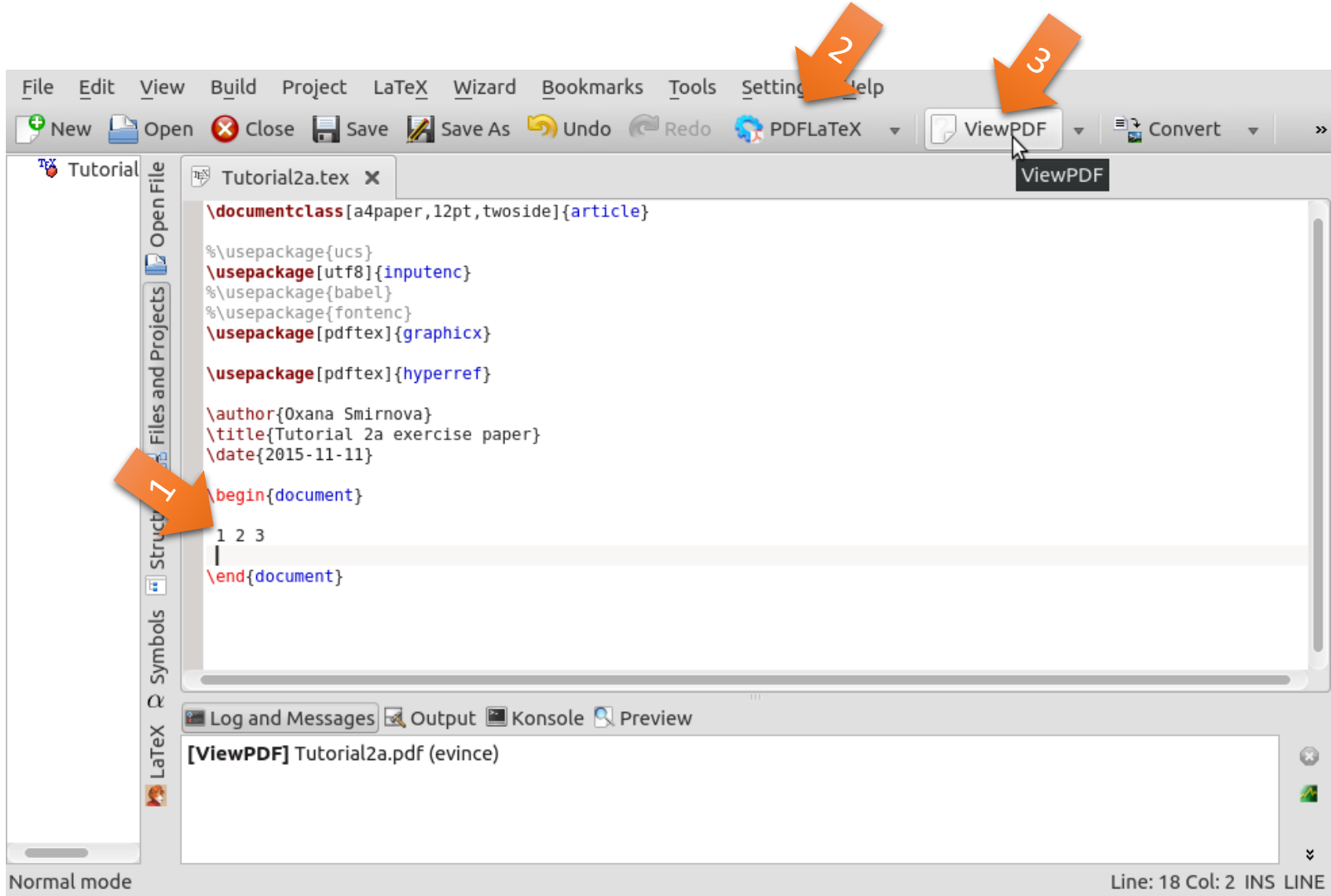
Whatever, we don't need this package, *comment* it out

Use `%` to *comment* (inactivate) any line in LaTeX; you can turn off many packages

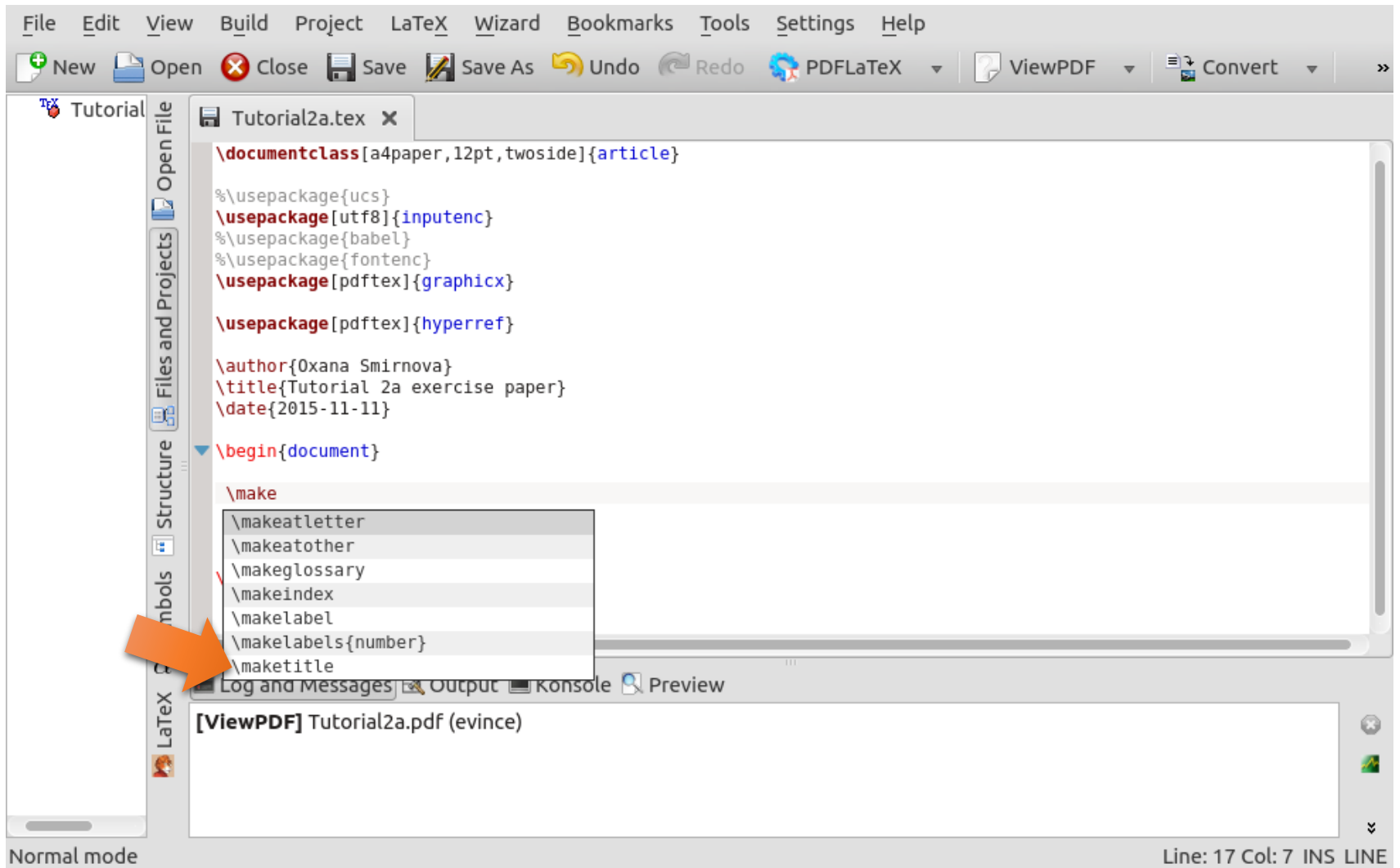


```
File Edit View Build Project LaTeX Wizard Bookmarks Tools Settings Help
New Open Close Save Save As Undo Redo PDFLaTeX ViewHTML Convert >>
Tutorial2a.tex x
\documentclass[a4paper,12pt,twoside]{article}
%\usepackage{ucs}
\usepackage[utf8]{inputenc}
%\usepackage{babel}
%\usepackage{fontenc}
\usepackage[pdftex]{graphicx}
\usepackage[pdftex]{hyperref}
\author{Oxana Smirnova}
\title{Tutorial 2a exercise paper}
\date{2015-11-11}
\begin{document}
\end{document}
Log and Messages Output Konsole Preview
./Tutorial2a.tex:0: File `Tutorial2a.out' has changed.
[PDFLaTeX] 0 errors, 2 warnings, 0 badboxes
[PDFLaTeX] Done!
Normal mode Line: 6 Col: 2 INS LINE
```

Add some text, build and view the result



Where's the title? Let's make it: `\maketitle`



The screenshot shows a LaTeX editor window with the following content:

```
\documentclass[a4paper, 12pt, twoside]{article}

%\usepackage{ucs}
\usepackage[utf8]{inputenc}
%\usepackage{babel}
%\usepackage{fontenc}
\usepackage[pdftex]{graphicx}

\usepackage[pdftex]{hyperref}

\author{Oxana Smirnova}
\title{Tutorial 2a exercise paper}
\date{2015-11-11}

\begin{document}

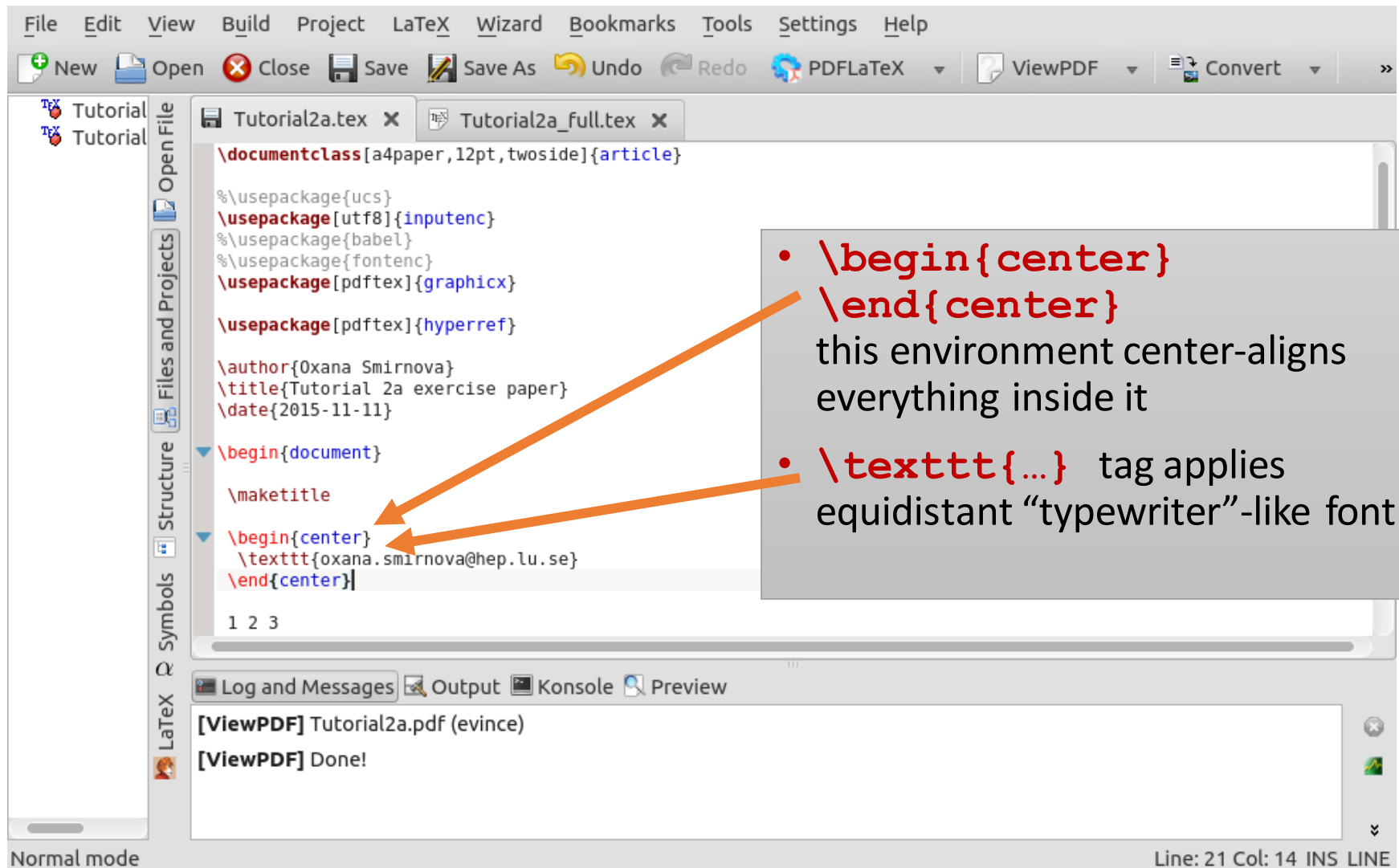
\make
  \makeatletter
  \makeatother
  \makeglossary
  \makeindex
  \makelabel
  \makeLabels{number}
  \maketitle
\end{document}
```

The dropdown menu for `\make` is open, showing the following options:

- `\makeatletter`
- `\makeatother`
- `\makeglossary`
- `\makeindex`
- `\makelabel`
- `\makeLabels{number}`
- `\maketitle`

The status bar at the bottom indicates "Normal mode" and "Line: 17 Col: 7 INS LINE".

Would be nice to add e-mail, centered



The screenshot shows a LaTeX editor window with the following code in the main editor:

```
\documentclass[a4paper, 12pt, twoside]{article}

%\usepackage{ucs}
\usepackage[utf8]{inputenc}
%\usepackage{babel}
%\usepackage{fontenc}
\usepackage[pdftex]{graphicx}

\usepackage[pdftex]{hyperref}

\author{Oxana Smirnova}
\title{Tutorial 2a exercise paper}
\date{2015-11-11}

\begin{document}

\maketitle

\begin{center}
\texttt{oxana.smirnova@hep.lu.se}
\end{center}

1 2 3
```

Two orange arrows point from the code to a callout box:

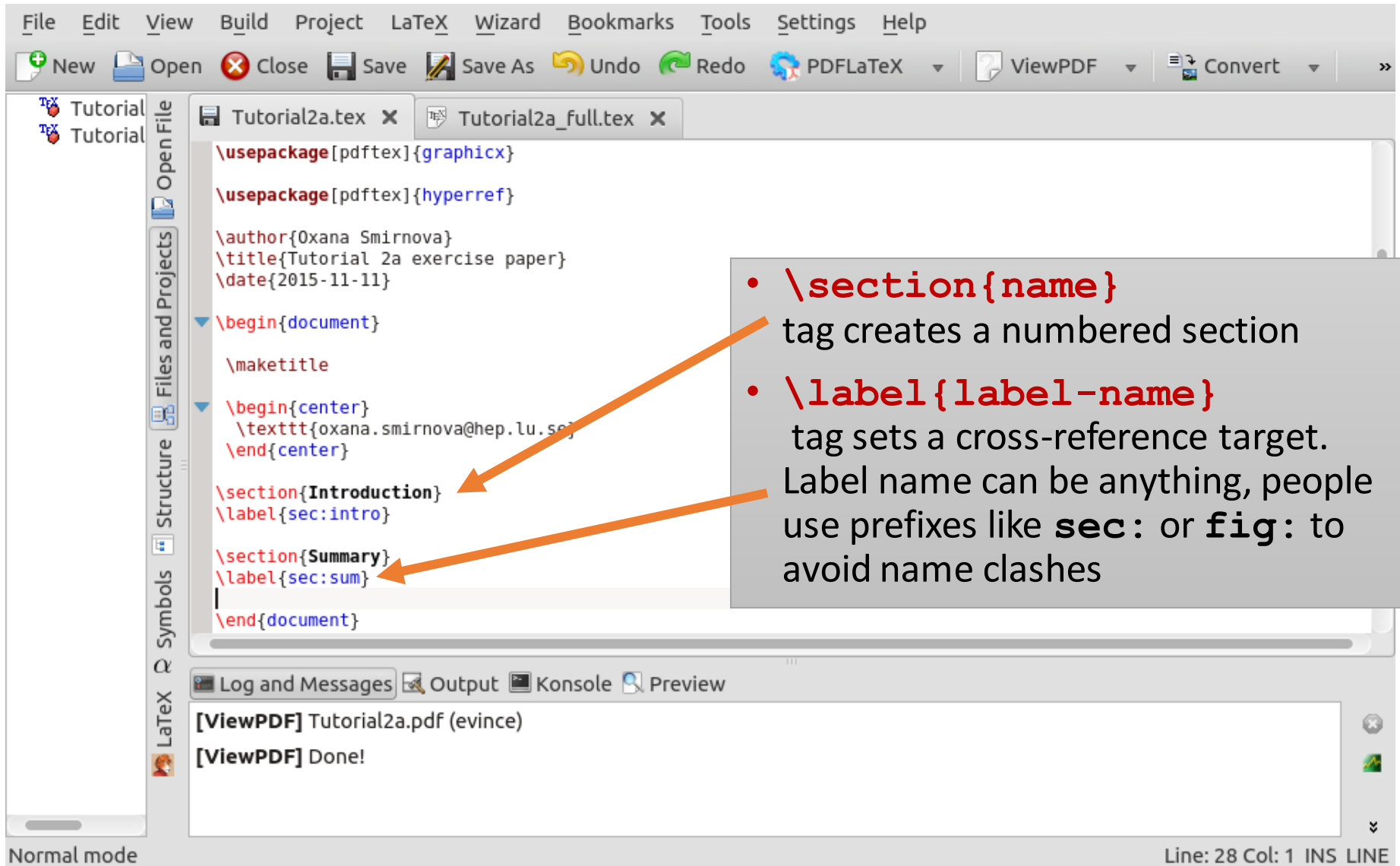
- `\begin{center}`
`\end{center}`
this environment center-aligns everything inside it
- `\texttt{...}` tag applies equidistant “typewriter”-like font

The bottom of the window shows the Log and Messages pane with the following entries:

```
[ViewPDF] Tutorial2a.pdf (evince)
[ViewPDF] Done!
```

Normal mode Line: 21 Col: 14 INS LINE

Time to add some sections and labels for cross-reference



The screenshot shows a LaTeX editor window with the following code in the main editor:

```
\usepackage[pdftex]{graphicx}
\usepackage[pdftex]{hyperref}

\author{Oxana Smirnova}
\title{Tutorial 2a exercise paper}
\date{2015-11-11}

\begin{document}

\maketitle

\begin{center}
\texttt{oxana.smirnova@hep.lu.se}
\end{center}

\section{Introduction}
\label{sec:intro}

\section{Summary}
\label{sec:sum}

\end{document}
```

Two orange arrows point from the callout box to the `\section{Introduction}` and `\section{Summary}` lines in the code.

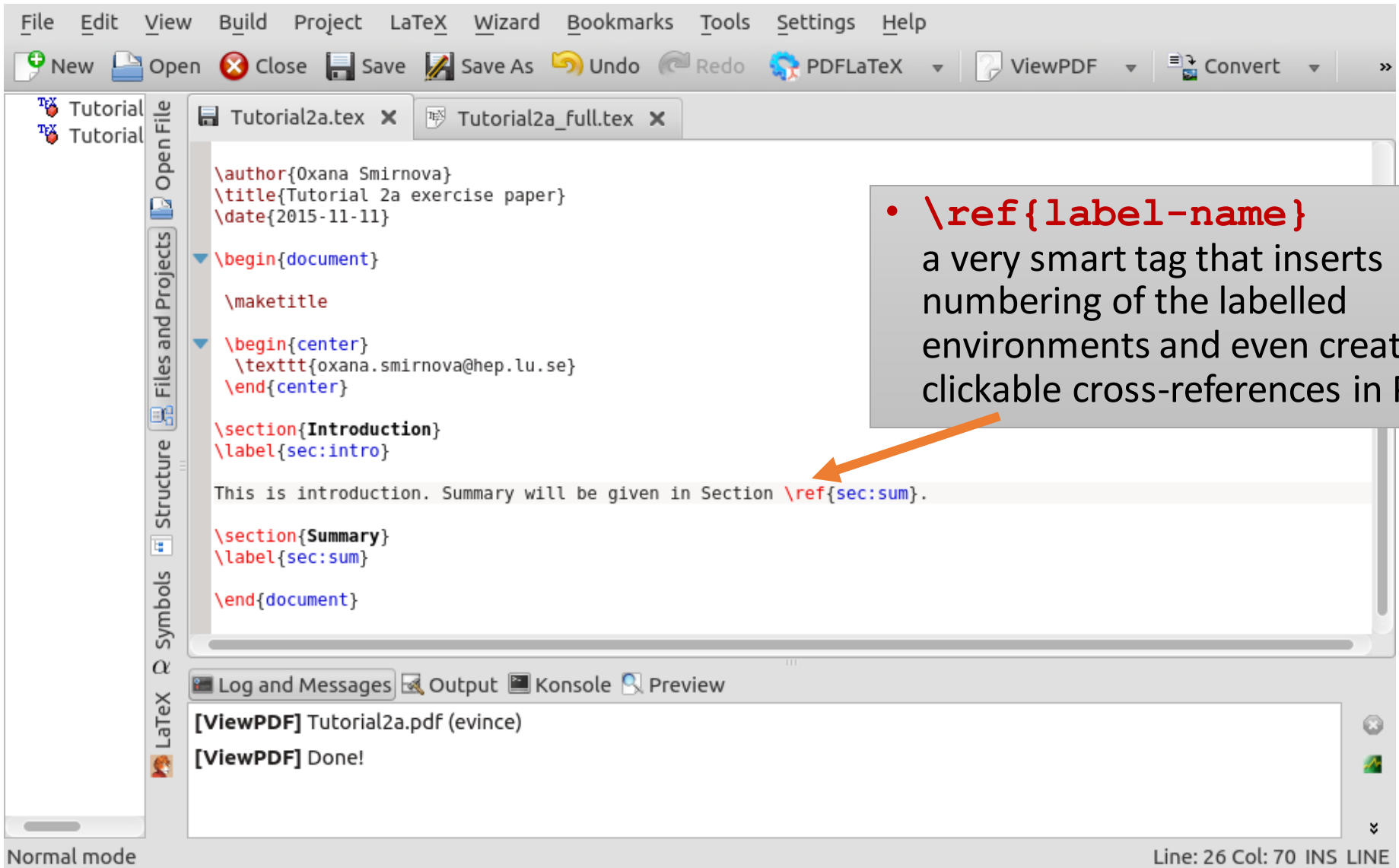
• `\section{name}`
tag creates a numbered section

• `\label{label-name}`
tag sets a cross-reference target. Label name can be anything, people use prefixes like **sec:** or **fig:** to avoid name clashes

Log and Messages: [ViewPDF] Tutorial2a.pdf (evince)
[ViewPDF] Done!

Normal mode Line: 28 Col: 1 INS LINE

So how do we do cross-referencing?



The screenshot shows a LaTeX editor window with the following content:

```
\author{Oxana Smirnova}
\title{Tutorial 2a exercise paper}
\date{2015-11-11}

\begin{document}

  \maketitle

  \begin{center}
    \texttt{oxana.smirnova@hep.lu.se}
  \end{center}

  \section{Introduction}
  \label{sec:intro}

  This is introduction. Summary will be given in Section \ref{sec:sum}.

  \section{Summary}
  \label{sec:sum}

\end{document}
```

The text "This is introduction. Summary will be given in Section \ref{sec:sum}." is highlighted in grey. An orange arrow points from a callout box to the `\ref{sec:sum}` command.

• `\ref{label-name}`
a very smart tag that inserts numbering of the labelled environments and even creates clickable cross-references in PDF

Log and Messages: [ViewPDF] Tutorial2a.pdf (evince)
[ViewPDF] Done!

Normal mode Line: 26 Col: 70 INS LINE

Let's add a picture

The screenshot shows a LaTeX editor window with the following content:

```
\begin{center}
\texttt{oxana.smirnova@hep.lu.se}
\end{center}

\section{Introduction}
\label{sec:intro}

This is introduction. Summary will be given in Section 2.

\section{About Linux}
\label{sec:linux}

\begin{figure}
\includegraphics{penguin.png}
\end{figure}

\section{Summary}
\label{sec:sum}

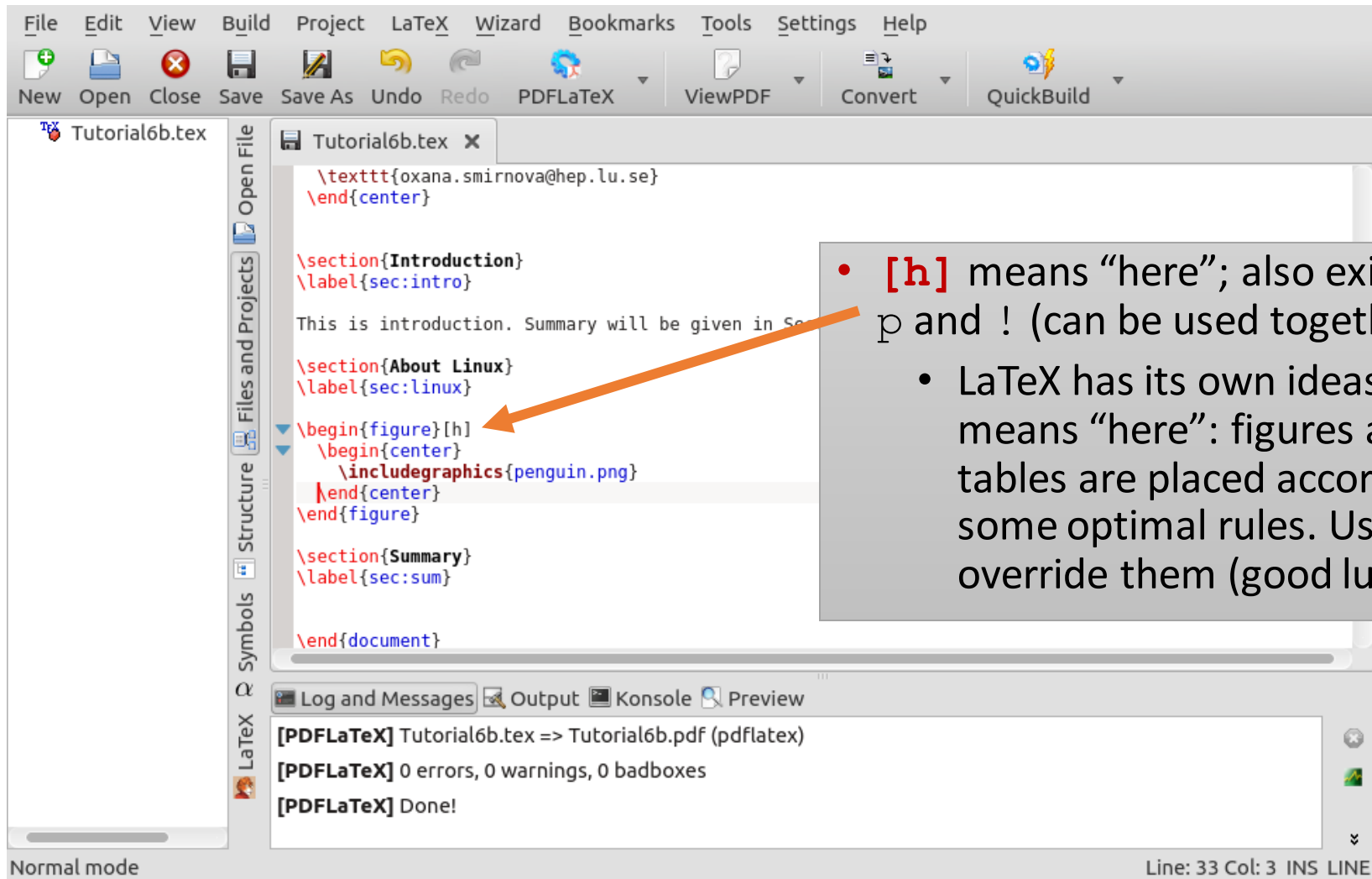
\end{document}
```

The callout box contains the following text:

- Get yourself a penguin (or a cat) from Google
- **`\begin{figure}`**
`\end{figure}`
the environment for figures
- **`\includegraphics{...}`** inserts actual files

At the bottom of the editor, the status bar shows "Normal mode" and "Line: 34 Col: 13 INS LINE".

This looked ugly, let's pin it and center it



The screenshot shows a LaTeX editor window with the following code in the main editor:

```
\texttt{oxana.smirnova@hep.lu.se}
\end{center}

\section{Introduction}
\label{sec:intro}

This is introduction. Summary will be given in Section 2.

\section{About Linux}
\label{sec:linux}

\begin{figure}[h]
\begin{center}
\includegraphics{penguin.png}
\end{center}
\end{figure}

\section{Summary}
\label{sec:sum}

\end{document}
```

The callout box contains the following text:

- **[h]** means “here”; also exist H, t, b, p and ! (can be used together)
- LaTeX has its own ideas what means “here”: figures and tables are placed according to some optimal rules. Use “!” to override them (good luck...)

The status bar at the bottom of the editor shows: Normal mode, Line: 33 Col: 3 INS LINE.

Every figure needs a caption

The screenshot shows a LaTeX editor window with the following content:

```
\texttt{oxana.smirnova@hep.lu.se}
\end{center}

\section{Introduction}
\label{sec:intro}

This is introduction. Summary will be given in

\section{About Linux}
\label{sec:linux}

\begin{figure}[h]
\begin{center}
\includegraphics{penguin.png}
\caption{Penguin symbolises Linux}
\end{center}
\end{figure}

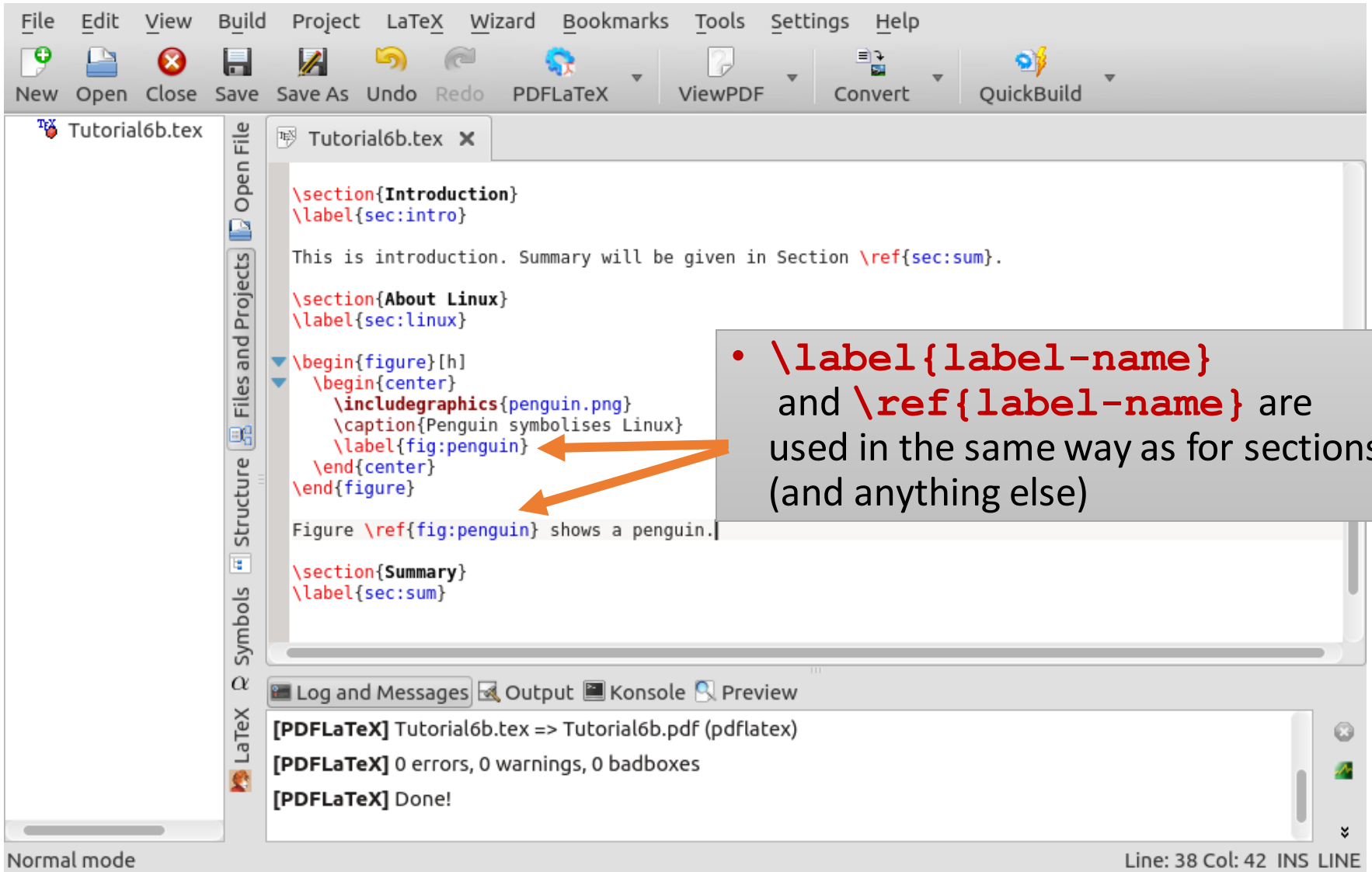
\section{Summary}
\label{sec:sum}
```

A callout box on the right contains the following text:

- `\caption{text}`
Inserts numbered caption; caption text can be formatted the same way as any other text (with few exceptions)

The callout box has an orange arrow pointing to the `\caption{Penguin symbolises Linux}` line in the code. The editor's status bar at the bottom right shows "Line: 33 Col: 39 INS LINE".

We also want to cross-reference figures



The screenshot shows a LaTeX editor window with the following content:

```
\section{Introduction}
\label{sec:intro}

This is introduction. Summary will be given in Section \ref{sec:sum}.

\section{About Linux}
\label{sec:linux}

\begin{figure}[h]
\begin{center}
\includegraphics{penguin.png}
\caption{Penguin symbolises Linux}
\label{fig:penguin}
\end{center}
\end{figure}

Figure \ref{fig:penguin} shows a penguin.

\section{Summary}
\label{sec:sum}
```

A callout box contains the following text:

- `\label{label-name}` and `\ref{label-name}` are used in the same way as for sections (and anything else)

The callout box has two orange arrows pointing to the `\label{fig:penguin}` line in the figure block and the `\ref{fig:penguin}` line in the text block.

Log and Messages:

```
[PDFLaTeX] Tutorial6b.tex => Tutorial6b.pdf (pdflatex)
[PDFLaTeX] 0 errors, 0 warnings, 0 badboxes
[PDFLaTeX] Done!
```

Normal mode Line: 38 Col: 42 INS LINE

Final adjustments

The screenshot shows a LaTeX editor window with the following code in the main editor:

```
\section{Introduction}
\label{sec:intro}

This is introduction. Summary will be given

\section{About Linux}
\label{sec:linux}

\begin{figure}[h]
\begin{center}
\includegraphics[width=2cm]{penguin.png}
\caption{Penguin symbolises Linux}
\label{fig:penguin}
\end{center}
\end{figure}

Figure \ref{fig:penguin} shows a \textit{penguin}.

\section{Summary}
\label{sec:sum}
```

The callout box contains the following text:

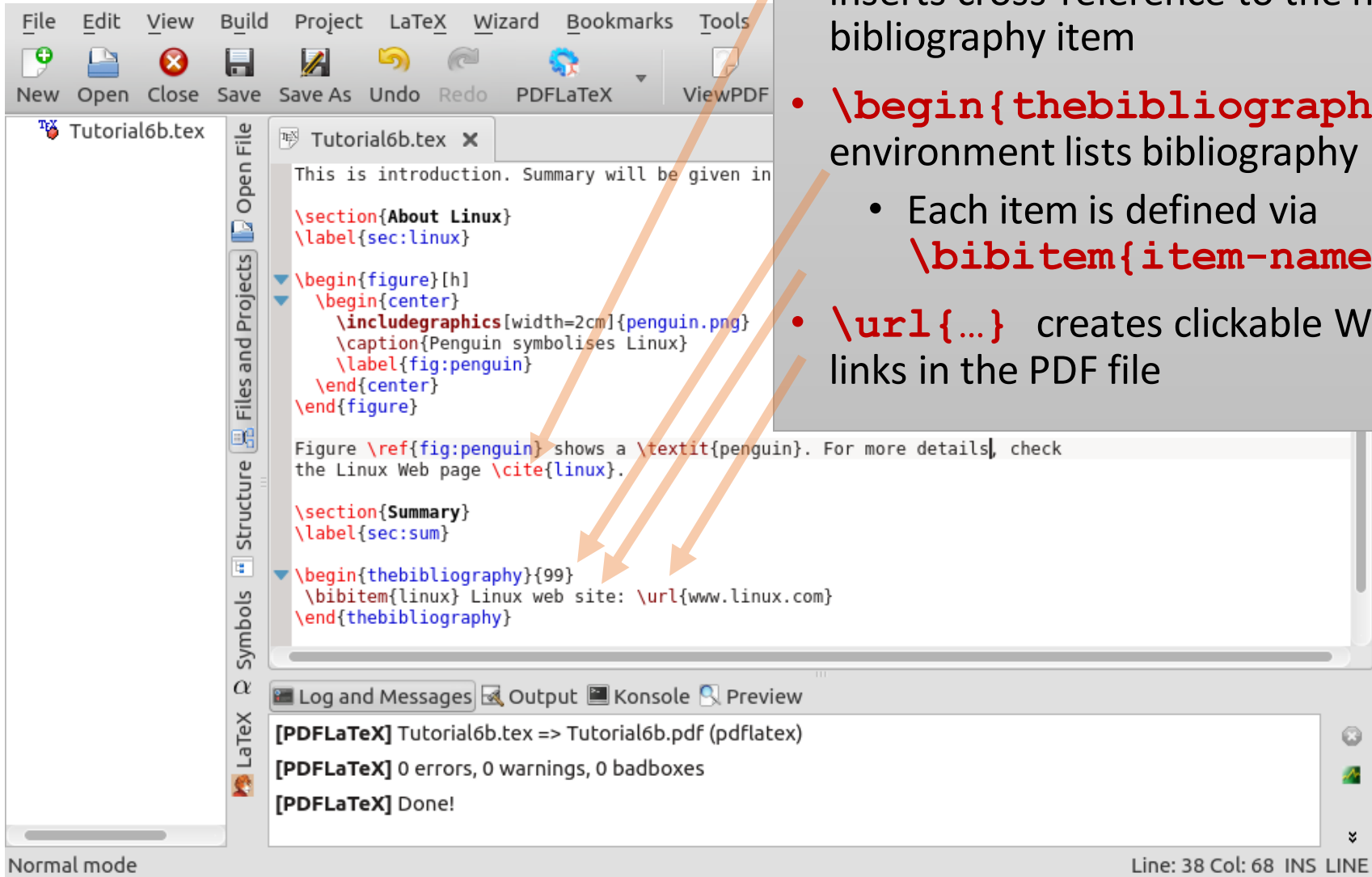
- `\includegraphics [] {...}` can take various options specified in []
- `\textit{...}` applies *italic* (slanted) font to the text

The Log and Messages window at the bottom shows the following output:

```
[PDFLaTeX] Tutorial6b.tex => Tutorial6b.pdf (pdflatex)
[PDFLaTeX] 0 errors, 0 warnings, 0 badboxes
[PDFLaTeX] Done!
```

Normal mode Line: 38 Col: 50 INS LINE

We have to cite bibliography reference now



The screenshot shows a LaTeX editor window with a document titled 'Tutorial6b.tex'. The document content includes a section 'About Linux', a figure of a penguin, a section 'Summary', and a bibliography. A callout box on the right explains the LaTeX commands used in the document:

- `\cite{item-name}` inserts cross-reference to the named bibliography item
- `\begin{thebibliography}` environment lists bibliography items
 - Each item is defined via `\bibitem{item-name}`
- `\url{...}` creates clickable Web links in the PDF file

The document content is as follows:

```
This is introduction. Summary will be given in

\section{About Linux}
\label{sec:linux}

\begin{figure}[h]
\begin{center}
\includegraphics[width=2cm]{penguin.png}
\caption{Penguin symbolises Linux}
\label{fig:penguin}
\end{center}
\end{figure}

Figure \ref{fig:penguin} shows a \textit{penguin}. For more details, check
the Linux Web page \cite{linux}.

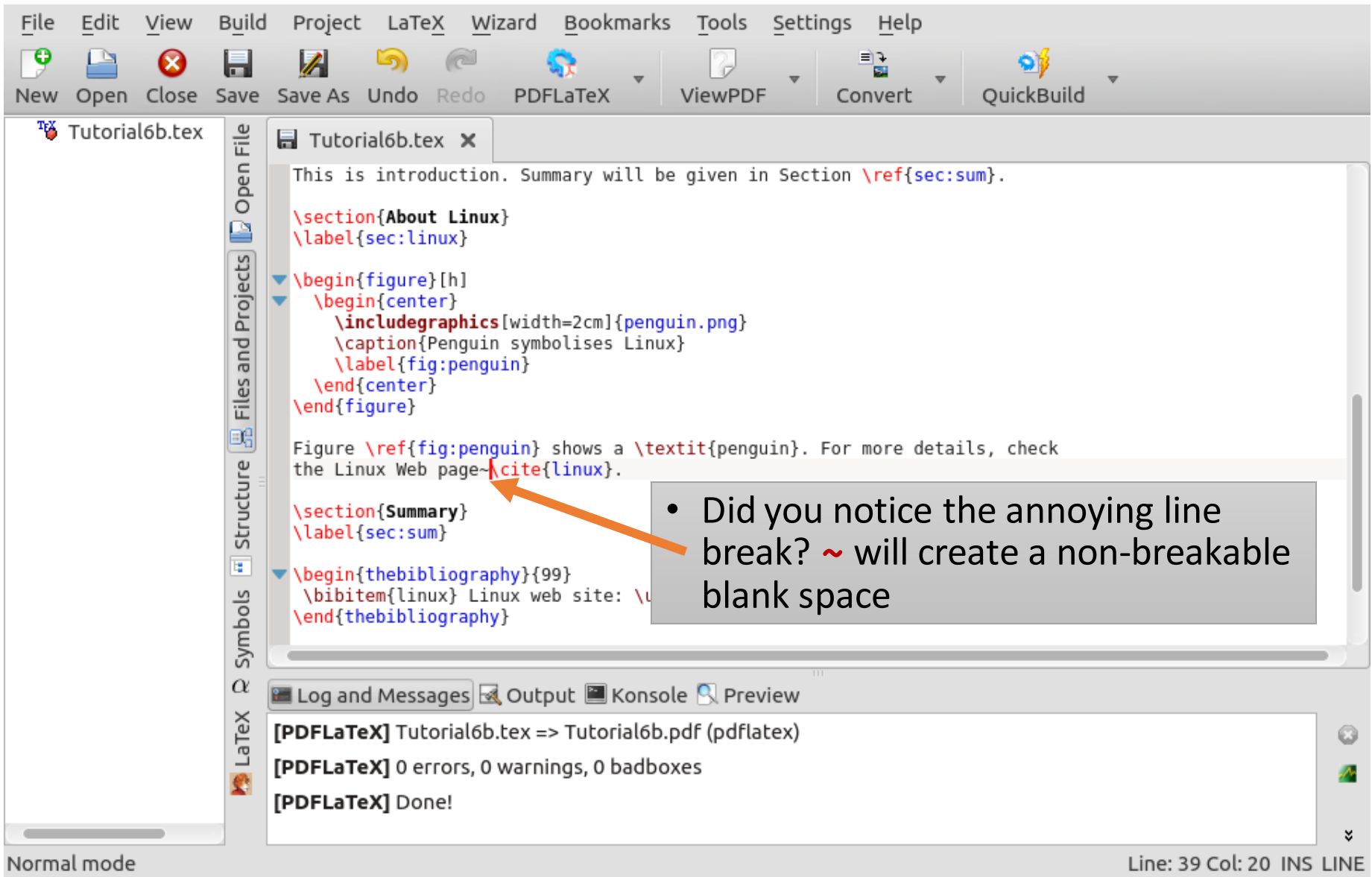
\section{Summary}
\label{sec:sum}

\begin{thebibliography}{99}
\bibitem{linux} Linux web site: \url{www.linux.com}
\end{thebibliography}
```

Log and Messages: [PDFLaTeX] Tutorial6b.tex => Tutorial6b.pdf (pdflatex)
[PDFLaTeX] 0 errors, 0 warnings, 0 badboxes
[PDFLaTeX] Done!

Normal mode Line: 38 Col: 68 INS LINE

One small detail: non-breaking space



The screenshot shows a LaTeX editor window with the following content:

```
This is introduction. Summary will be given in Section \ref{sec:sum}.
```

```
\section{About Linux}
\label{sec:linux}

\begin{figure}[h]
\begin{center}
\includegraphics[width=2cm]{penguin.png}
\caption{Penguin symbolises Linux}
\label{fig:penguin}
\end{center}
\end{figure}

Figure \ref{fig:penguin} shows a \textit{penguin}. For more details, check
the Linux Web page-\cite{linux}.
```

```
\section{Summary}
\label{sec:sum}

\begin{thebibliography}{99}
\bibitem{linux} Linux web site: \u
\end{thebibliography}
```

An orange arrow points to the line break in the `\cite{linux}` command. A callout box contains the text:

- Did you notice the annoying line break? ~ will create a non-breakable blank space

The Log and Messages window at the bottom shows the following output:

```
[PDFLaTeX] Tutorial6b.tex => Tutorial6b.pdf (pdflatex)
[PDFLaTeX] 0 errors, 0 warnings, 0 badboxes
[PDFLaTeX] Done!
```

Normal mode Line: 39 Col: 20 INS LINE

Make a new \subsection and a table

The screenshot shows a LaTeX editor window with the following code:

```
\end{center}
\end{figure}

Figure \ref{fig:penguin} shows a \textit{
the Linux Web page~\cite{linux}.

\subsection{Linux flavours}
\label{sec:flavours}

\begin{table}[h]
\begin{center}
\caption{Different flavours of Linux}
\label{tab:flavours}
\begin{tabular}{c|c|c|c} % | is for border, c is for centering
\textbf{Distribution}&RedHat&Debian&SuSE\\
Fedora 20 & X & & \\
\end{tabular}
\end{center}
\end{table}

\section{Summary}
```

Annotations in the image explain the following LaTeX commands and symbols:

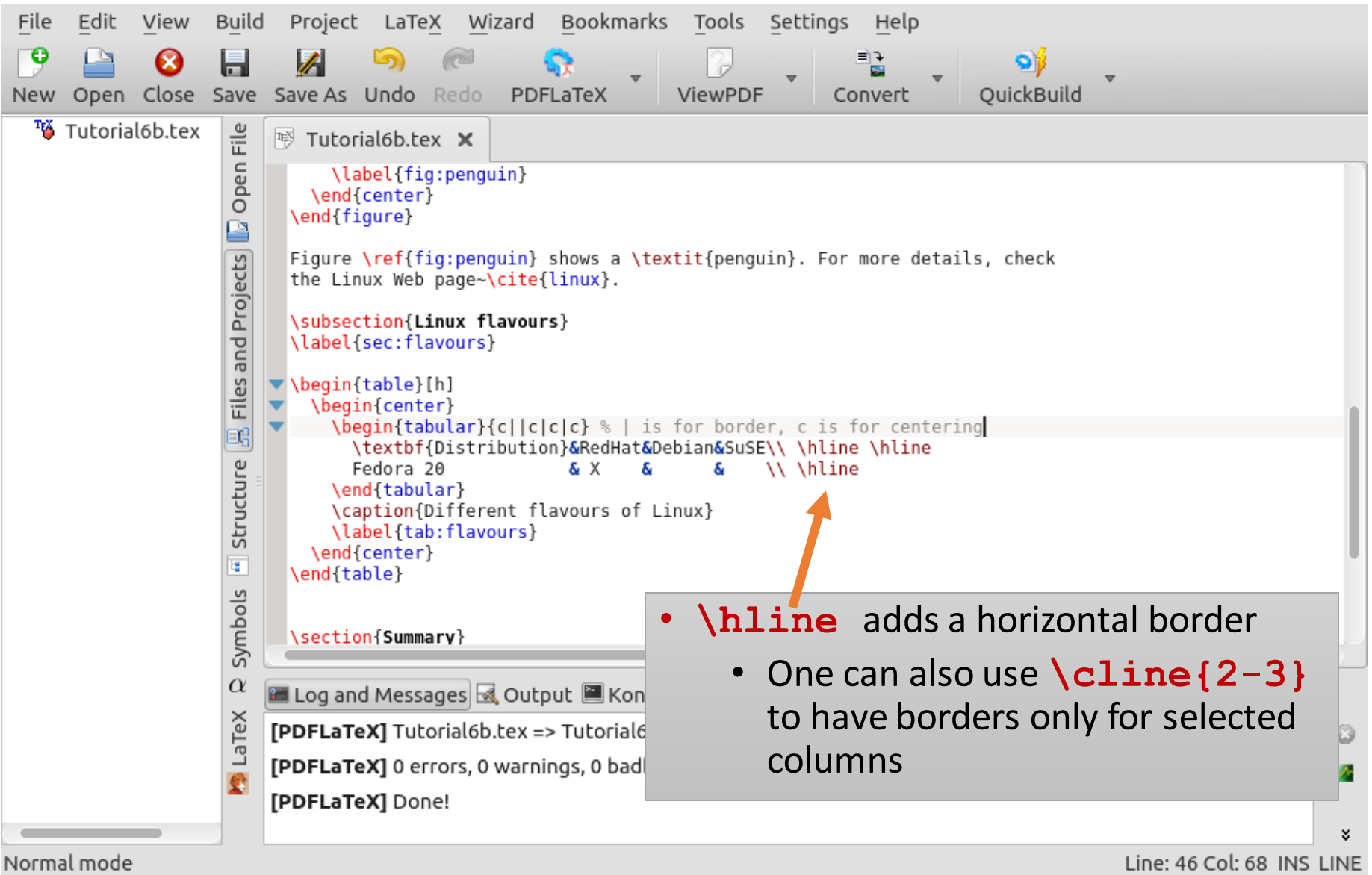
- `\begin{table}` is very similar to `\begin{figure}`
- Tables themselves are defined by `\begin{tabular}`
- Each letter in `{c|c}` indicates a column; “c” means centered, can be also “l” or “r”
- `&` separates cells
- `\\` ends rows

The Log and Messages window at the bottom shows the compilation output:

```
[PDFLaTeX] Tutorial6b.tex => Tutorial6b.pdf (pdflatex)
[PDFLaTeX] 0 errors, 0 warnings, 0 badboxes
[PDFLaTeX] Done!
```

Normal mode Line: 48 Col: 64 INS LINE

It was an ugly table, let's make it slightly better



The screenshot shows a LaTeX editor window with the following content:

```
\label{fig:penguin}
\end{center}
\end{figure}

Figure \ref{fig:penguin} shows a \textit{penguin}. For more details, check
the Linux Web page~\cite{linux}.

\subsection{Linux flavours}
\label{sec:flavours}

\begin{table}[h]
\begin{center}
\begin{tabular}{c|c|c|c} % | is for border, c is for centering
\textbf{Distribution}&RedHat&Debian&SuSE\\ \hline \hline
Fedora 20 & X & & \\ \hline
\end{tabular}
\caption{Different flavours of Linux}
\label{tab:flavours}
\end{center}
\end{table}

\section{Summary}
```

The callout box contains the following text:

- `\hline` adds a horizontal border
- One can also use `\cline{2-3}` to have borders only for selected columns

Log and Messages: [PDFLaTeX] Tutorial6b.tex => Tutorial6b.pdf [PDFLaTeX] 0 errors, 0 warnings, 0 bad boxes [PDFLaTeX] Done!

Normal mode Line: 46 Col: 68 INS LINE

A footnote

The screenshot shows a LaTeX editor window with the following content:

```
Figure \ref{fig:penguin} shows a \textit{penguin}. For more details, check
the Linux Web page~\cite{linux}.

\subsection{Linux flavours}
\label{sec:flavours}

Table~\ref{tab:flavours} lists some Linux flavours~\footnote{Only one is shown
for simplicity}.

\begin{table}[h]
\begin{center}
\begin{tabular}{c|c|c|c} % | is for border, c is for centering
\textbf{Distribution}&RedHat&Debian&SuSE\\ \hline \hline
Fedora 20 & X & & \\ \hline
\end{tabular}
\caption{Different flavours of Linux}
\label{tab:flavours}
\end{center}
\end{table}

\section{Summary}
```

An orange arrow points from the `\footnote` command in the code to a callout box:

- `\footnote{text}` puts text in the automatically numbered footnote

The bottom of the window shows the Log and Messages panel with the following output:

```
[PDFLaTeX] Tutorial6b.tex => Tutorial6b.pdf (pdflatex)
[PDFLaTeX] 0 errors, 0 warnings, 0 badboxes
[PDFLaTeX] Done!
```

Normal mode Line: 45 Col: 16 INS LINE

Now let's try mathematics in a new section

The screenshot shows a LaTeX editor window with the following content:

```
\caption{Different flavours of Linux}
\label{tab:flavours}
\end{center}
\end{table}

\section{About mathematics}
\label{sec:math}

In-line math in  $\LaTeX$  is enclosed in  $\$$  symbols. Backslash  $\backslash$ 
is used to denote special symbols.

Subscripts and superscripts are always math:  $A_x$ ,  $A_{xy}$ ,
 $e^x$  and  $e^{x^2}$ . Using underscore  $\_$  outside math without  $\backslash$ 
causes big troubles.

All special symbols are also math:  $\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\delta$ ,  $\sin$ 
 $x$ ,  $\hbar$ ,  $\lambda$ ,  $\dots$  More information can be
found in Ref.  $\sim$   $\cite{latex}$ .
```

Log and Messages:

```
[PDFLaTeX] Tutorial6b.tex => Tutorial6b.pdf (pdflatex)
[PDFLaTeX] 0 errors, 0 warnings, 0 badboxes
[PDFLaTeX] Done!
```

Normal mode Line: 70 Col: 28 INS LINE

A yellow starburst callout bubble contains the text: "Noticed something wrong?"

Corrected mathematics text

The screenshot shows a LaTeX editor interface with a menu bar (File, Edit, View, Build, Project, LaTeX, Wizard, Bookmarks, Tools, Settings, Help) and a toolbar with icons for New, Open, Close, Save, Save As, Undo, Redo, PDFLaTeX, ViewPDF, Convert, and QuickBuild. The main window displays the source code for 'Tutorial6b.tex' and 'intro.tex'. The code includes a table caption, a section header, and text explaining LaTeX syntax for math symbols. Two orange arrows point from a callout box to specific parts of the code: one to the underscore in '_troubles' and another to the backslash in '\textbackslash'.

```
\caption{Different flavours of Linux}
\label{tab:flavours}
\end{center}
\end{table}

\section{About mathematics}
\label{sec:math}

In-line math in \LaTeX \ is enclosed in \$ symbols. Backslash \textbackslash \
is used to denote special symbols.

Subscripts and superscripts are always math: $A_x$, $A_{xy}$,
$e^x$ and $e^{x^2}$. Using underscore \_ outside math without \textbackslash
causes big\_troubles.

All special symbols are also math: $\alpha$, $\beta$, $\gamma$, $\delta$, $\sin
x$, $\hbar$, $\lambda$, $\dots$ More information can be
found in Ref.~\cite{latex}.
```

Log and Messages Output Kon

[PDFLaTeX] Tutorial6b.tex => Tutorial6

[PDFLaTeX] 0 errors, 0 warnings, 0 bad

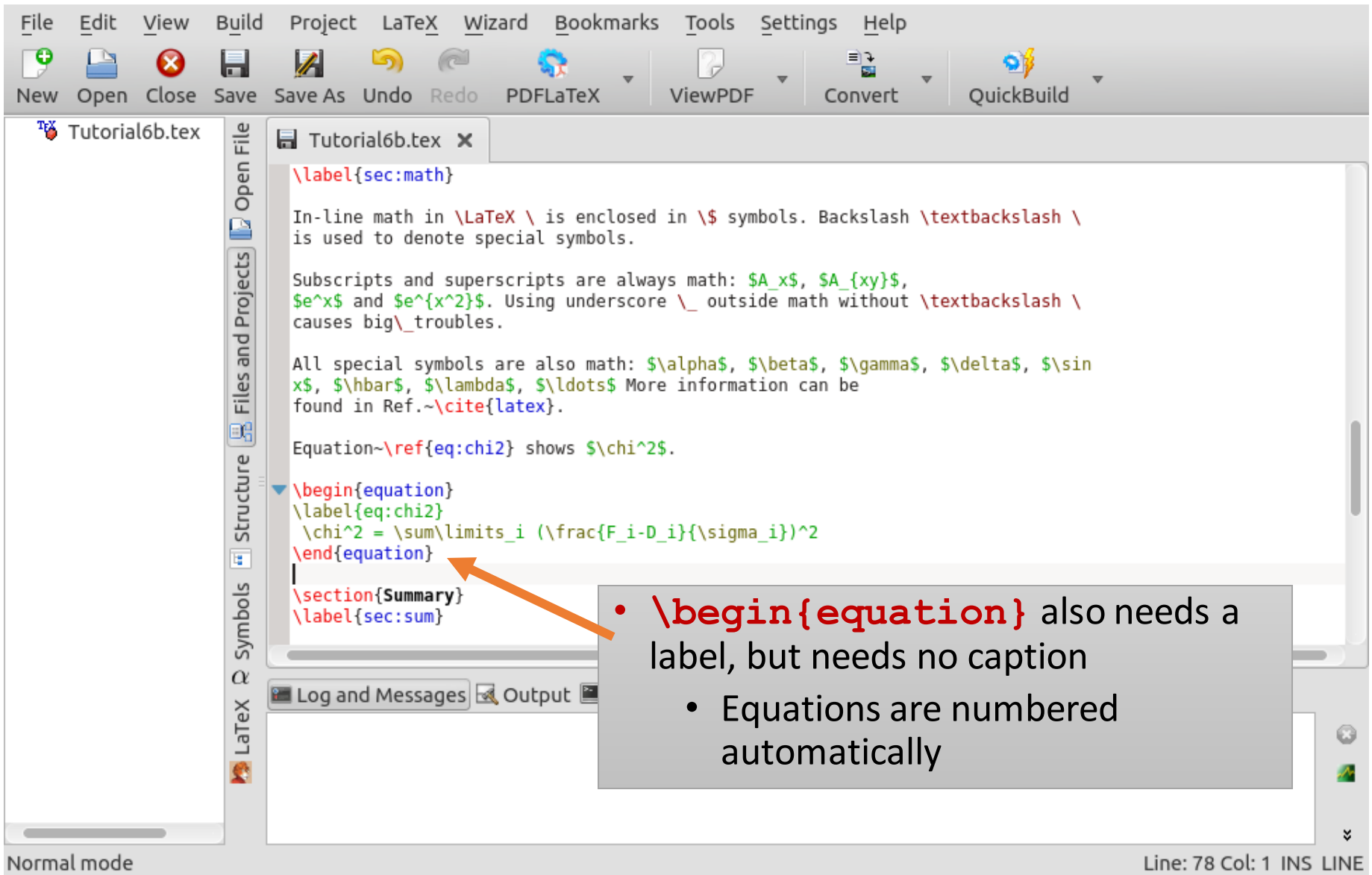
[PDFLaTeX] Done!

Normal mode

Line: 70 Col: 28 INS LINE

- Group several characters in `{ }`
- Always escape underscore with a backslash
 - Even in URL links!

And now let's try an equation



The screenshot shows a LaTeX editor window with the following content:

```
\label{sec:math}
```

In-line math in `\LaTeX` is enclosed in `\$` symbols. Backslash `\textbackslash` is used to denote special symbols.

Subscripts and superscripts are always math: `$A_x`, `$A_{xy}`, `$e^x` and `$e^{x^2}`. Using underscore `_` outside math without `\textbackslash` causes big`_` troubles.

All special symbols are also math: `$_alpha$`, `$_beta$`, `$_gamma$`, `$_delta$`, `$_sin x$`, `$_hbar$`, `$_lambda$`, `$_ldots$` More information can be found in Ref.~`\cite{latex}`.

Equation~`\ref{eq:chi2}` shows `$_chi^2$`.

```
\begin{equation}
\label{eq:chi2}
\chi^2 = \sum\limits_i (\frac{F_i-D_i}{\sigma_i})^2
\end{equation}
```

`\section{Summary}`
`\label{sec:sum}`

Log and Messages Output

Normal mode

Line: 78 Col: 1 INS LINE

A callout box with an orange arrow pointing to the `\begin{equation}` line contains the following text:

- `\begin{equation}` also needs a label, but needs no caption
- Equations are numbered automatically

Oh, that was also ugly. Fixing...

The screenshot shows a LaTeX editor window with the following content:

```
\label{sec:math}

In-line math in \LaTeX \ is enclosed in \$ symbols. Backslash \textbackslash \
is used to denote special symbols.

Subscripts and superscripts are always math: $A_x$, $A_{xy}$,
$e^x$ and $e^{x^2}$. Using underscore \_ outside math without \textbackslash \
causes big\_troubles.

All special symbols are also math: $\alpha$, $\beta$, $\gamma$, $\delta$, $\sin
x$, $\hbar$, $\lambda$, $\ldots$ More information can be
found in Ref.~\cite{latex}.

Equation~\ref{eq:chi2} shows $\chi^2$.

\begin{equation}
\label{eq:chi2}
\chi^2 = \sum\limits_i \left(\frac{F_i-D_i}{\sigma_i}\right)^2
\end{equation}

\section{Summary}
\label{sec:sum}
```

An orange arrow points from a callout box to the `\left` and `\right` commands in the equation block.

- `\left` (and `\right`) are some of the very many mathematical symbols in LaTeX

Normal mode Line: 78 Col: 1 INS LINE

And finally, some bulleted lists

The screenshot shows a LaTeX editor window with the following content:

```
File Edit View Build Project LaTeX Wizard Bookmarks Tools Settings Help
New Open Close Save Save As Undo Redo PDFLaTeX ViewPDF Convert QuickBuild

Tutorial6b.tex
All special symbols are also math:  $\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\delta$ ,  $\sin$ 
 $x$ ,  $\hbar$ ,  $\lambda$ ,  $\dots$  More information can be
found in Ref.~\cite{latex}.

Equation~\ref{eq:chi2} shows  $\chi^2$ .

\begin{equation}
\label{eq:chi2}
\chi^2 = \sum\limits_i \left(\frac{F_i - D_i}{\sigma_i}\right)^2
\end{equation}

\section{Summary}
\label{sec:sum}

We learned the following:
\begin{itemize}
\item Linux is good
\item \LaTeX \ is good
\end{itemize}

\begin{thebibliography}{99}
```

An orange arrow points from the `\begin{itemize}` command to a callout box:

- `\begin{itemize}` creates a list of un-numbered items

The bottom of the window shows the Log and Messages pane with the following output:

```
[ViewPDF] Tutorial6b.pdf (evince)
[ViewPDF] Done!
```

Normal mode Line: 85 Col: 24 INS LINE

There are also numbered lists

The screenshot shows a LaTeX editor window with the following content:

```
found in Ref.~\cite{latex}.
```

Equation~\ref{eq:chi2} shows χ^2 .

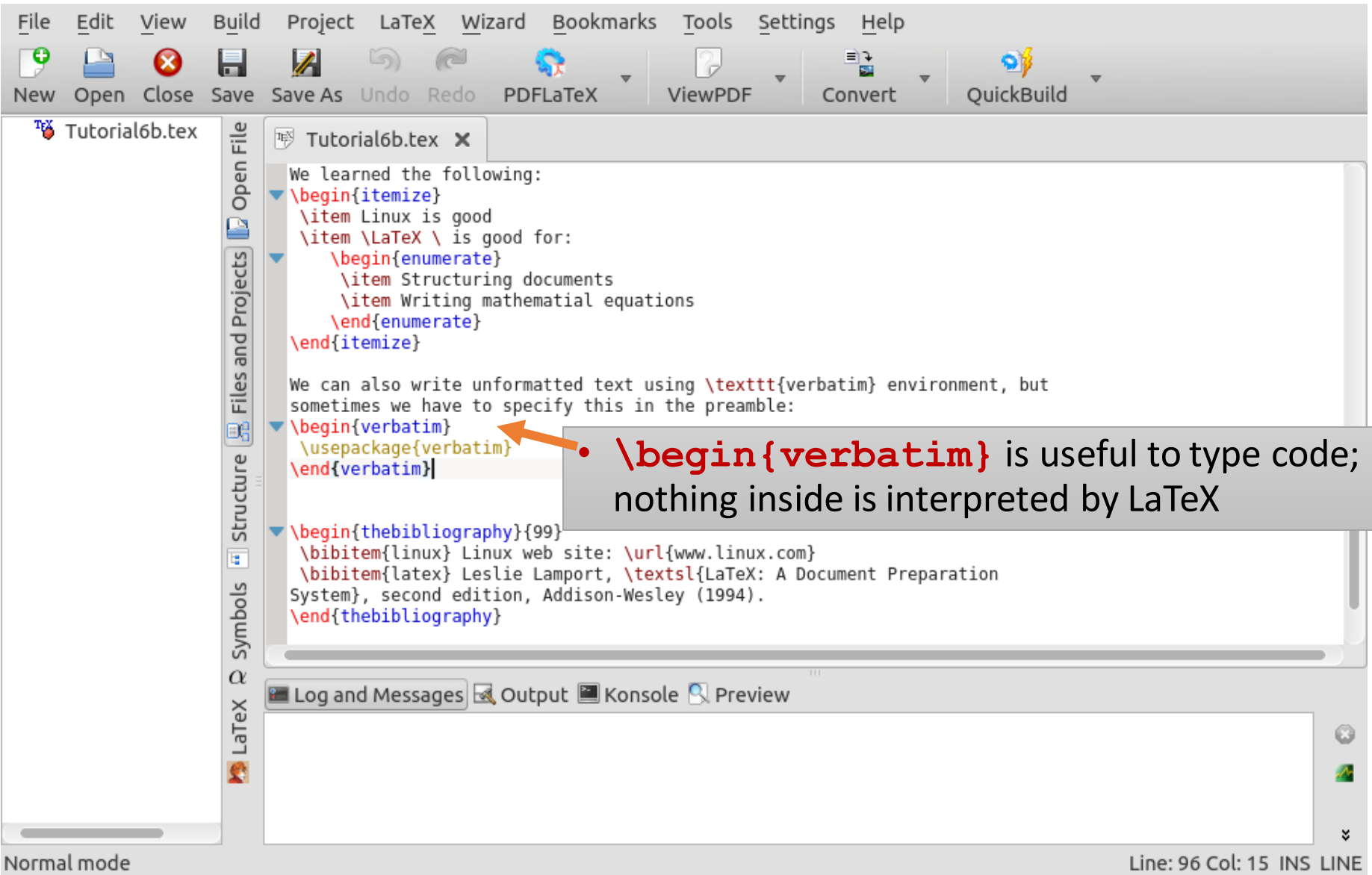
```
\begin{equation}
\label{eq:chi2}
\chi^2 = \sum\limits_i \left(\frac{F_i - D_i}{\sigma_i}\right)^2
\end{equation}

\section{Summary}
\label{sec:sum}

We learned the following:
\begin{itemize}
\item Linux is good
\item \LaTeX \ is good for:
\begin{enumerate}
\item Structuring documents
\item Writing mathematical equations
\end{enumerate}
\end{itemize}
\end{pre>
```

• `\begin{enumerate}` is similar to `\begin{itemize}`, only the items get numbered

Last, but not least: you can have unformatted text, too



The screenshot shows a LaTeX editor interface with a menu bar (File, Edit, View, Build, Project, LaTeX, Wizard, Bookmarks, Tools, Settings, Help) and a toolbar (New, Open, Close, Save, Save As, Undo, Redo, PDFLaTeX, ViewPDF, Convert, QuickBuild). The main editor window displays the file 'Tutorial6b.tex' with the following content:

```
We learned the following:  
\begin{itemize}  
  \item Linux is good  
  \item \LaTeX \ is good for:  
    \begin{enumerate}  
      \item Structuring documents  
      \item Writing mathematical equations  
    \end{enumerate}  
  \end{itemize}  
  
We can also write unformatted text using \texttt{verbatim} environment, but  
sometimes we have to specify this in the preamble:  
\begin{verbatim}  
  \usepackage{verbatim}  
\end{verbatim}  
  
\begin{thebibliography}{99}  
  \bibitem{linux} Linux web site: \url{www.linux.com}  
  \bibitem{latex} Leslie Lamport, \textsl{LaTeX: A Document Preparation  
System}, second edition, Addison-Wesley (1994).  
\end{thebibliography}
```

An orange arrow points from a callout box to the `\begin{verbatim}` line in the code. The callout box contains the text: **`\begin{verbatim}` is useful to type code; nothing inside is interpreted by LaTeX**

The bottom of the editor shows a status bar with 'Normal mode' on the left and 'Line: 96 Col: 15 INS LINE' on the right. The bottom panel contains tabs for 'Log and Messages', 'Output', 'Konsole', and 'Preview'.

And the result should look like this:

Tutorial 2a exercise paper

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2015-11-11

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1 Introduction

This is introduction. Summary will be given in Section 4.

2 About Linux



Figure 1: Penguin symbolises Linux

Figure 1 shows a *penguin*. For more details, check the Linux Web page [1].

2.1 Linux flavours

Table 1 lists some Linux flavours [1].

Distribution	RedHat	Debian	SuSE
Fedora 23	X		

Table 1: Different flavours of Linux

¹Only one is shown for simplicity

3 About mathematics

In-line math in \LaTeX is enclosed in $\$$ symbols. Backslash \backslash is used to denote special symbols.

Subscripts and superscripts are always math: A_x , A_{xy} , e^x and e^{x^2} . Using underscore $_$ outside math without \backslash causes `big_troubles`.

All special symbols are also math: α , β , γ , δ , $\sin x$, h , λ , \dots . More information can be found in Ref. [2].

Equation 1 shows χ^2 .

$$\chi^2 = \sum_i \left(\frac{F_i - D_i}{\sigma_i} \right)^2 \quad (1)$$

4 Summary

We learned the following:

- Linux is good
- \LaTeX is good for:
 1. Structuring documents
 2. Writing mathematical equations

We can also write unformatted text using `verbatim` environment, but sometimes we have to specify this in the preamble:

```
\usepackage{verbatim}
```

References

- [1] Linux web site: www.linux.com
- [2] Leslie Lamport, *LaTeX: A Document Preparation System*, second edition, Addison-Wesley (1994).

Concluding notes

- There are many more LaTeX tags and environments
- Those tags and environments we tried have many different options
- Every tag and environment can be modified and tailored to your needs
- There is no way you can remember all the tags; get yourself a book (many good books exist), or use any of the multiple online references
 - Wikibooks: <http://en.wikibooks.org/wiki/LaTeX>
 - LaTeX Reference Manual: <http://home.gna.org/latexrefman/>
- All serious scientific journals have official LaTeX templates and styles, usually complete with instructions