

# **GEN 600: Lecture 2**

## **LaTeX Part I**

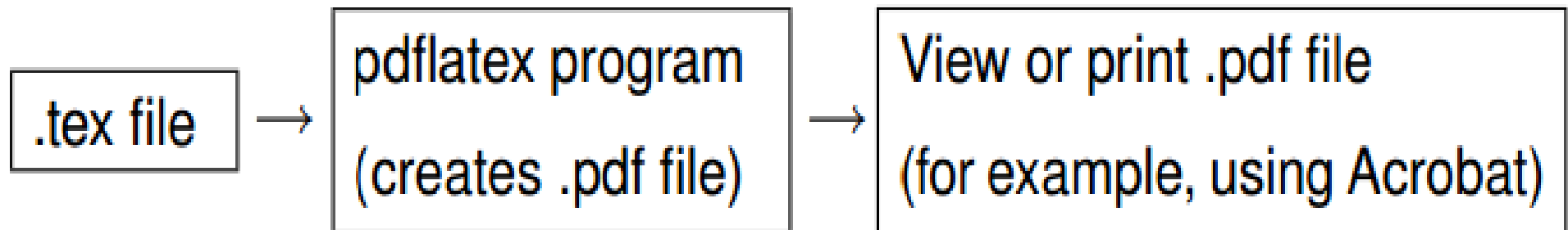
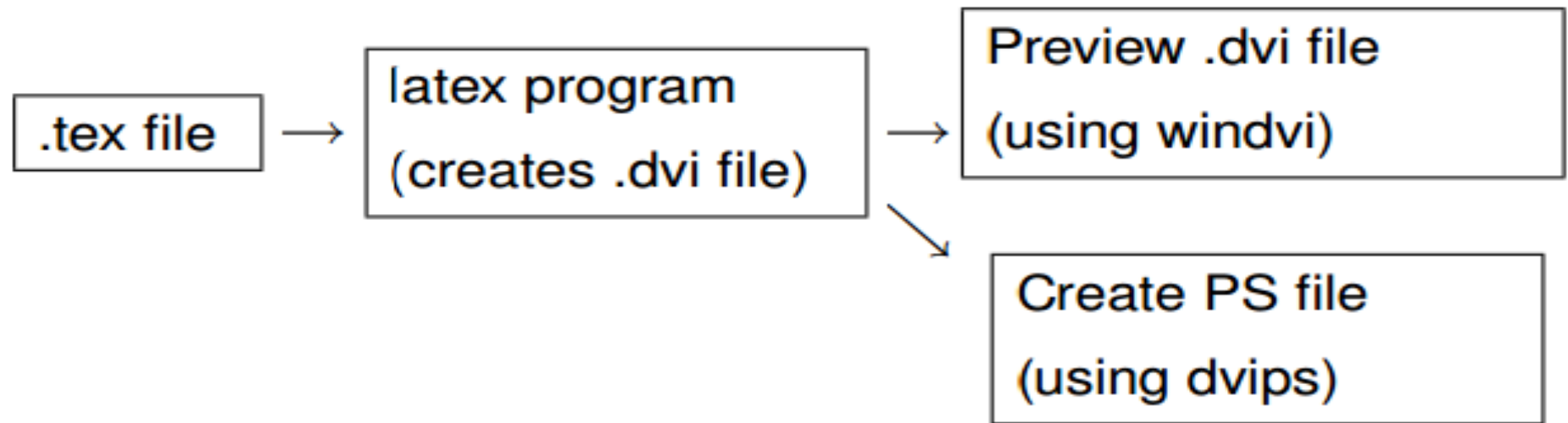
# LaTeX

- Pronounced lay-tek or lah-tek
- Document preparation system for producing professional-looking documents (WYSIWYM).
- Not a word processor (WYSIWYG).
- LATEX is based on TEX, a typesetting system designed in 1978. TEX is a low-level language that computers can work with, but most people would find difficult to use; so LATEX has been developed to make it easier.
- Is a scripting language specifically designed for mathematicians and scientists to write scientific articles and reports.
- You will write a script and then execute it to generate a .pdf file.
- Aim is to focus on content not appearance and formatting.
- will have to inform LATEX about any formatting by writing commands such as `\document`, `\section{name}` , `\includegraphics \caption \label \bibliography{}`  
....

# How to write LaTeX?

- You can write in Notepad and save it in .tex file but it is easier to use a dedicated LATEX editor.
- Free software available for most operating systems (e.g. LyX, TeXStudio, Kile ...)
- Online collaborative editors are available as well (Overleaf: <https://www.overleaf.com/>, ShareLaTeX: <https://www.sharelatex.com/>)
- Objective of this lecture:
  - Knowing an overview of how LATEX works
  - Getting started with some useful commands
  - To be ready for assignment 1 😊

# How LaTeX works?



# LaTeX Document

**12pt** prints the document using twelve-point type.  
**twoside** formatted for printing on both sides of the paper. This is the default for the book style.  
**twocolumn** produces two columns of text on each page.

```
\documentclass[options]{article}
```

```
Preamble (for LATEX commands only)
```

```
\begin{document}
```

```
Document text (text with embedded LATEX commands)
```

```
\end{document}
```

- The Document class command determines the overall layout of the document. In addition to article class, which is a good all-purpose class, other commonly-used classes are:
  - report – for longer documents containing chapters, put the title on a separate page
  - thesis – for writing a thesis
  - book – for books
  - letter – for letters
  - slides – for making transparencies
- Anything between a `\begin{}` & `\end{}` is called an environment and within the document environment you can start writing your document.

# Commands

- All commands start with back-slash
- Commands are case-sensitive.
  - `\Delta` →  $\Delta$       while      `\delta` →  $\delta$
  - `Roman` → I,II, III, IV ... while `roman` → i,ii, iii, iv
- Some commands take arguments enclosed in braces { }

# Inserting title, author, date

```
\title{My First Document}
```

```
\author{My Name}
```

```
\date{\today}
```

```
\maketitle
```

# Sectioning

- `\section{name}`
- `\subsection{name}`
- `\subsubsection{name}`
- `\paragraph{...}`
- `\subparagraph{...}`
- Paragraphs may be either separated by a line, and no indentation, or just by indentation. The following can be added in the preamble if not in the used template
  - `\parindent 0pt` for no indentation
  - `\parskip 2ex` for line spacing
- report and book classes have also `\chapter{...}`



# Table of Contents

- Very easy:
  - `\tableofcontents`
- often directly after the title page, all sections, subsections and subsubsections will be added to the Table of Contents automatically with the page numbers.
- To change the page numbering so that roman numerals (i, ii, iii) are used for pages before the main document starts.
  - `\pagenumbering{option}`
  - Options:
    - gobble - no numbers
    - arabic - arabic numbers
    - roman - roman numbers

# Formatting (typesetting) text

- `\textbf{mytext}`: **mytext**
- `\textit{mytext}`: *mytext*
- `\textsl{mytext}`: *mytext*
- `\textsc{mytext}` : MYTEXT
- `\texttt{mytext}` : mytext
- `\textsf{mytext}`: mytext
- `\textrm{mytext}` : mytext
- `\underline{mytext}`:mytext

# Formatting (typesetting) text

- `{\tiny tiny words}`
- `{\scriptsize scriptsize words}`
- `{\footnotesize footnotesize words}`
- `{\small small words}`
- `{\normalsize normalsize words}`
- `{\large large words}`
- `{\Large Large words}`
- `{\LARGE LARGE words}`
- `{\huge huge words}`

`tiny words`

`scriptsize words`

`footnotesize words`

`small words`

`normalsize words`

`large words`

`Large words`

`LARGE words`

`huge words`

# Comments and Spacing

- %single line comment until carriage return
- consecutive spaces are treated as a single space.
- Several empty lines are treated as one empty line.
- Two backslashes (\\) can be used to start a new line.
- `\newline`
- To add blank vertical space of a height specified in typographical points (pt) : use the `\vspace{...}`
  - e.g.: `\vspace{12pt}` of a height of a 12pt font.
- To add horizontal space: `\hspace{2in}`
- Exercise: How to write:
  - Item #1A\642 costs \$8 & is sold at a ~10% profit.

# Special symbols

- # \$ % & \_ { } ~ ^ \
  - #: Parameter in a macro
  - \$: Used to begin and end math mode
  - %: Used for comments in the input file
  - & : Tab mark, used in alignments of table columns
  - \_ : Used in math mode for subscripts
  - ^ : Used in math mode for superscripts
  - { } : Used for options for some commands
  - ~
- To use these symbols precede it with backslash: \\$ \& \# \% \\_ \{ \} \^{} \~{} \textbackslash.

# Lists

- Numbered

```
\begin{enumerate}
\item First thing
\item Second thing
  \begin{itemize}
\item A sub-thing
\item Another sub-thing
  \end{itemize}
\item Third thing
\end{enumerate}
```

# Lists (cont.)

- Unnumbered

```
\begin{itemize}
  \item[-] First thing
  \item[+] Second thing
\begin{itemize}
  \item[*] A sub-thing
  \item[*] Another sub-thing
\end{itemize}
\item[-] Third thing
\end{itemize}
```

# Figures

- To add a figure

```
\begin{figure}
  \centering
  \includegraphics[width=\linewidth]{cat.jpg}
  %image placed in the same folder of .tex file otherwise
  %write the path relative to the directory of .tex file
  \caption{A cat.} %text to appear under the figure
  \label{fig:catimage}
  %label to use to reference the figure elsewhere
\end{figure}
```

- To reference a figure
  - Figure `\ref{fig:catimage}` shows a cat.
- Adding list of figures:
  - `\listoffigures`



# Tables

```
\begin{table}

  \begin{tabular}{|l|c|}

    Col1 & Col2 \\

    \hline

    Col1_Row2 & Col2_Row2 \\

  \end{tabular}

\end{table}
```

- Options to use after `\begin{tabular}`
  - l : left-aligned column (small L)
  - c : centre-aligned column
  - | : for a vertical line
  - r : right-aligned column
  - p : Paragraph column entry
  - || : for double vertical lines
- & is placed between columns, \\ is placed at the end of a row
- \hline inserts a horizontal line.
- \cline{1-2} inserts a partial horizontal line between column 1 and column 2

# Captioning and Labeling

- To insert label to allow you to refer to the table or figure in your text:
  - `\label{mylabel}`
- To refer to the labeled part.
  - `\ref{mylabel}`

# Placement

- [h] is the placement specifier. h means put the figure/table approximately here (if it will fit).
- [t] : top of the page
- [b] : bottom of the page
- [p] : a separate page for figures
- You can also add !, which overrides the rule LATEX uses for choosing where to put the figure, and makes it more likely it will put it where you want (even if it doesn't look so good).
- \centering centres the image on the page, if not used images/tables are left-aligned by default.

# Exercise

- Write Latex code to produce this table:

City	Year		
	2006	2007	2008
London	45789	46551	51298
Berlin	34549	32543	29870
Paris	49835	51009	51970

- For more complex table formats, merged cells, landscape layout and more, check:

<https://www.latex-tutorial.com/tutorials/tables/>

# **For next LaTeX lecture .....**

- **Equations**
- **Bibliography and References**
- **Using templates and packages.....**

# LaTeX Assignment 1 – Due Feb 27

- Write a proposal for a research topic (not necessarily your actual topic, you can choose any topic of your interest)
- Use Latex to add the following logical structures to your document:
  - Title page with author and date
  - Table of contents page
  - Add sections for Introduction, Proposed Idea, Research Plan
  - Add subsections in the Research Plan section for Research team, Research activities and Time Plan
  - Add a figure in the Proposed Idea section
  - Add an itemized list summarizing contributions for your idea in the Proposed Idea section
  - Add a numbered list for the research activities in the Research activities section with simple description for each.
  - Add a table for a timed plan for research activities in the Time Plan subsection.

# Resources and references

- <http://www.docs.is.ed.ac.uk/skills/documents/3722/3722-2014.pdf>
- <https://www.latex-tutorial.com/tutorials/>
- TEX FAQs: <http://www.tex.ac.uk/faq/>