

Lecture 11 - COMPSCI111/111G SS 2018

# Today's lecture

- ▶ What is LaTeX?
- ▶ A brief history of LaTeX
- ▶ Basic LaTeX commands:
  - ▶ Document structure
  - ▶ Environments
  - ▶ Special characters; quotes, ellipsis, dashes

# What is LaTeX?

- ▶ LaTeX is a document preparation system for typesetting
- ▶ LaTeX encourages authors to focus on their document's content and leave the formatting for later
- ▶ LaTeX can be used for a range of documents:
  - ▶ Essays and theses
  - ▶ Journal articles
  - ▶ Technical documents
  - ▶ Presentations

## 1 Introduction

# History of LaTeX

- ▶ Donald Knuth created TeX in 1978
  - ▶ Aim was to make it easy to create books and to ensure that documents looked the same on any computer
  - ▶ TeX files can be typeset into PDF files
- ▶ Leslie Lamport created LaTeX in 1985
  - ▶ LaTeX = Lamport TeX
  - ▶ Introduced a number of extensions to TeX which made it faster and easier to use
  - ▶ Soon, LaTeX became the standard way to use TeX



# Why use LaTeX?

- ▶ Very efficient when working with **large** documents
- ▶ Versatile **mathematical** tools
- ▶ LaTeX can automatically generate:
  - ▶ Table of contents
  - ▶ List of figures
  - ▶ Index
  - ▶ Bibliographies
- ▶ LaTeX distributions are open source

# 1 Introduction

# Using LaTeX

```
TeXPad - [F:\1111 Course Book\latex\exam\Chapter_1\exam.tex]
File Edit Search View Tools Macros Configure Windows Help

\section{Introduction}
\ix is a document preparation system. It is not a word processor, it
does not check spelling, and it is not a WYSIWYG program. \ix is
designed for typesetting. It allows a user to specify the way a document
will look when it is printed, based on the structure of that document.
In short, \ix is used to \texttt{\format} a text document.

\ix is a program that is available for most common platforms (e.g.
Macintosh OS, Windows, Linux). It takes as input file that consists of
plain ASCII text (such like as HTML source file) and produces output that
is in a format such as device independent (dvi), postscript (ps), or
portable document format (pdf). This output will be displayed exactly as
it will appear when printed.

\begin{figure}
\begin{center}
\includegraphics[Figures/Latex_CompiledProcess.eps]
\end{center}
\caption{Running \ix}
\end{figure}

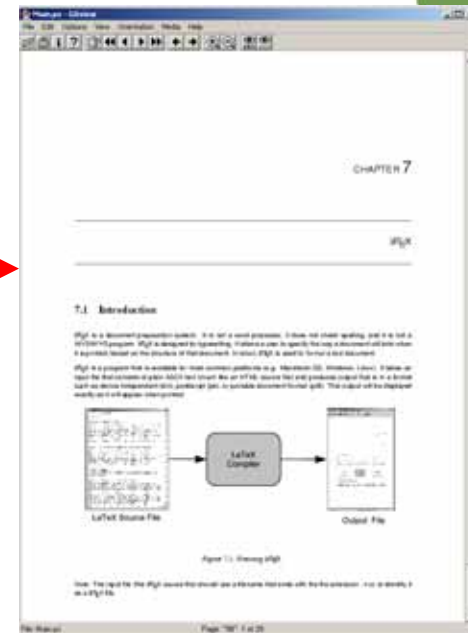
Note: The input file (the \ix source file) should use a filename that
ends with the file extension \texttt{.tex} to identify it as a \ix file.

\subsection{Why would we use LaTeX?}
The \ix program was originally developed to help mathematicians typeset
their documents. It is still the best product today to create
professional documents that use mathematical equations. It is also used
in many academic institutions to typeset theses and other large
documents.

Some of the commonly cited advantages of \ix are:
\begin{compactitem}
\item The finished documents look as if they were professionally printed.
\item \ix supports typesetting mathematical equations in a very
convenient way.
\item Long documents can be easily managed.
\item The table of contents, indexes, glossaries and bibliographies can
be generated easily.
\item \ix is free and runs on a wide range of platforms.
\end{compactitem}

In short, if you are creating a very long document (such as a thesis or a
book), or if you really care about the way your documents look, then \ix
is highly recommended. If you are only writing short documents, and you
don't care about the way they look when printed, then a simple word
processor such as Microsoft Word will probably fulfill your needs.
```

**LaTeX  
compiler**



# LaTeX commands

- ▶ Use to provide the LaTeX compiler with instructions

- ▶ General structure of LaTeX commands:

```
\commandname[options]{argument}
```

- ▶ Example of a LaTeX command:

```
\documentclass[a4paper]{article}
```

- ▶ Command name: documentclass
  - ▶ Options: a4paper
  - ▶ Argument: article
- ▶ Not all commands have options and/or arguments

## 1 Introduction

# Comments

- ▶ Used to annotate the document
- ▶ They are ignored by the LaTeX compiler

```
% Comments start with a percentage sign  
% All text is ignored until the end of the  
% line is reached
```



# Whitespace characters

- ▶ Includes spaces, tabs and line breaks
- ▶ Two or more consecutive whitespace characters are reduced down to a single space character

**A        sentence**

A sentence.

- ▶ One line break is treated as a space. However, two line breaks creates a new paragraph

**This is  
some text.**

**This is a sentence.**

This is some text.  
This is a sentence.

1 Introduction

# Whitespace

A                    B    C  
          D    E            F

A B C D E F

# Special characters

- ▶ These characters have a special meaning in LaTeX
  - ▶ Need to type an escape character ('\`\`') before you can type a special character
- ▶ There are 10 special characters in LaTeX

`\ $ % ^ & _ ~ # { }`

- ▶ Example:

A pie costs `\$4.00.`

A pie costs \$4.00.

A URL contains a `\backslash$` character.

A URL contains a `\` character.

## 2 First Document

# Creating a LaTeX document

```
\documentclass[a4paper]{article}
```

documentclass

```
\begin{document}
```

```
\title{A test document}
```

```
\maketitle
```

Preamble

```
This is an important document.
```

```
\end{document}
```

Document body

A test document

January 15, 2017

This is an important document.

# Documentclass command

- ▶ This command defines the type of document that is being typeset
- ▶ [option] used to define paper size
  - ▶ a4paper
  - ▶ a5paper
  - ▶ letterpaper
- ▶ {argument} used to define the type of document
  - ▶ Book
  - ▶ Report
  - ▶ Article
  - ▶ Letter

## 2 First Document

# Adding a title

- ▶ There are four commands that can be used to create the document's title
- ▶ `\title{document title}`
- ▶ `\author{author's name}`
- ▶ `\date{date here}`
  - ▶ By default, LaTeX will insert today's date
- ▶ `\maketitle`
  - ▶ This command inserts the title in the document and comes after the commands above

2 First Document

# Adding a title

```
\documentclass[a4paper]{book}

\begin{document}
\title{A book on LaTeX}
\author{R Baptista}
\date{2016}
\maketitle

LaTeX typesets documents.
\end{document}
```

A book on LaTeX

R Baptista

2016

# Environments

- ▶ Environments apply a specified change to the text within the environment
  - ▶ An environment will also start a new paragraph

```
\begin{environment name}  
...  
\end{environment name}
```

```
\begin{document}  
This is a very long sentence.  
\begin{center}  
This is some centered text.  
\end{center}  
\end{document}
```

This is a very long sentence.

This is some centered text.



## 2 First Document

# Environments

- ▶ document
  - ▶ Used to define the body of the document
- ▶ center
  - ▶ Aligns the content within the environment on the centre of the page
- ▶ displaymath, equation
  - ▶ Environments for displaying math equations
- ▶ itemize, enumerate, description
  - ▶ Three kinds of lists

# Exercise 1

- ▶ In this exercise, you will prepare your first LaTeX file. You may either work on some text of your own, or work with the text given below.

```
\documentclass[a4paper]{article}
```

```
\
```

Words are separated by one or more spaces.

```
\
```

Words are separated by one or more spaces.  
Paragraphs are separated by one or more blank lines.

### 3 Basic Commands

# Paragraphs and line breaks

- ▶ Earlier, we saw leaving a blank line between two pieces of text creates a new paragraph
- ▶ You can create a new line by using `\\`

```
\begin{document}
```

```
A gap between two lines.
```

```
Creates a new paragraph. Two backslashes creates \\  
a new line.
```

```
\end{document}
```

```
A gap between two lines.
```

```
Creates a new paragraph. Two backslashes creates  
a new line.
```

### 3 Basic Commands

# Footnotes

- ▶ Use `\footnote{}` within the text to insert a footnote

```
\begin{document}  
Pythagoras was born in Greece\footnote{Wikipedia}  
around 2,500 years ago.  
\end{document}
```

Pythagoras was born in Greece<sup>1</sup> around 2,500 years ago.

---

<sup>1</sup>Wikipedia

### 3 Basic Commands

# Quote marks

- ▶ LaTeX uses directional quotes (eg. “ ”) rather than unidirectional quotes (eg. " ")

- ▶ Single quotes

- ▶ Open using ` character and close using ' character

``Hello'`

‘Hello’

- ▶ Double quotes

- ▶ Open using `` characters and close using "" character

```Hello''`

“Hello”

### 3 Basic Commands

# Dashes

## ▶ Hyphen (-)

- ▶ Short dash to join different words together

**merry-go-round**

merry-go-round

## ▶ En dash (--)

- ▶ Longer dash used to indicate a range of values

**pages 45--50**

pages 45–50

## ▶ Em dash (---)

- ▶ Very long dash between words or phrases

**the start --- the finish**

the start — the finish

### 3 Basic Commands

# Ellipsis

- ▶ A character made of up three dots used to indicate missing text
- ▶ Must insert an ellipsis using the `\ldots` command, not three full stops, so that you get the correct spacing between the dots

There is `\ldots` missing

There is ... missing

### 3 Basic Commands

# Avoiding line breaks

- ▶ There can be times when we don't want LaTeX to automatically insert a new line break

**The Lord of the Rings is an epic high-fantasy novel series written by J. R. R. Tolkien, who was an English author.**

The Lord of the Rings is an epic high-fantasy novel series written by J. R. R. Tolkien, who was an English author.



### 3 Basic Commands

# Avoiding line breaks

- ▶ To avoid this, we use the tilde character (~) in place of the spaces

**The Lord of the Rings is an epic high-fantasy novel series written by J.~R.~R.~Tolkien, who was an English author.**

The Lord of the Rings is an epic high-fantasy novel series written by J. R. R. Tolkien, who was an English author.

### 3 Basic Commands

# Basic formatting

- ▶ `\emph` command emphasises the enclosed text

This was a `\emph{long}` lecture

This was a *long* lecture

- ▶ `\textbf` command makes the enclosed text bold

This was a `\textbf{cool}` lecture

This was a **cool** class

# Exercise 2

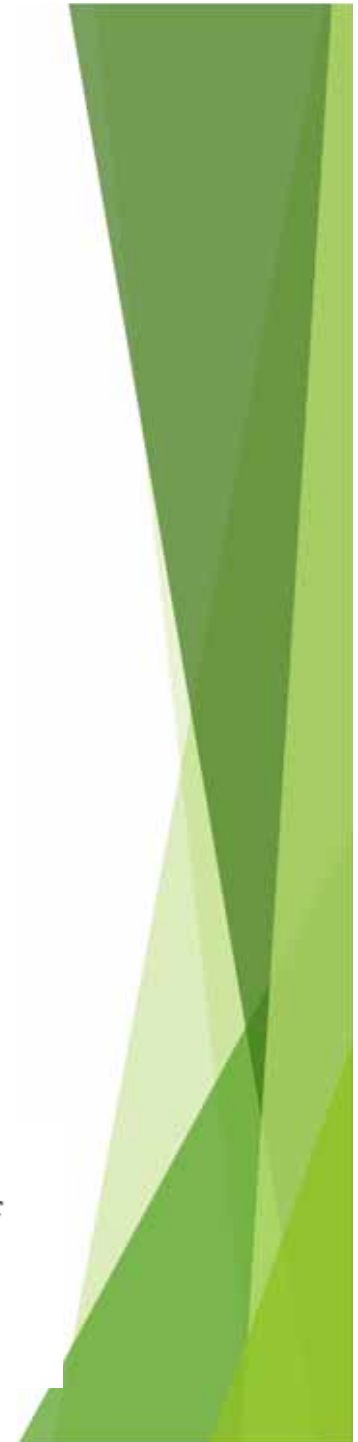
- ▶ In this exercise, you will prepare a LaTeX file. You may either work on some text of your own, or work with the text given below.

```
\documentclass[a4paper]{article}  
\
```

In March 2006, Congress raised that ceiling an additional \$0.79 trillion to \$8.97 trillion, which is approximately 68% of GDP. As of October 4, 2008, the Emergency Economic Stabilization Act of 2008 raised the current debt ceiling to 11.3 trillion.

```
\
```

In March 2006, Congress raised that ceiling an additional \$0.79 trillion to \$8.97 trillion, which is approximately 68% of GDP. As of October 4, 2008, the “Emergency Economic Stabilization Act of 2008” raised the current debt ceiling to \$11.3 trillion.



# Exercise 3

- ▶ What is the LaTeX code that would generate the following document?

Pythagoras

A. Professor

2017

Around 530 BC, Pythagoras moved to **Croton** — a Greek colony in southern Italy — and set up a religious sect.

This is where Pythagoras earned his reputation as a mystic.

Pythagoras was also a skilled mathematician ...

#### 4 Structuring a document

# Structuring a document

- ▶ `\part{ part name goes here }`
- ▶ `\chapter{ chapter name goes here }`
- ▶ `\section{ section name goes here }`
- ▶ `\subsection{ subsection name goes here }`
- ▶ `\subsubsection{ subsubsection name goes here }`

## 4 Structuring a document

# Example

```
\documentclass{article}
\begin{document}

\section{Introduction}

The problem of \ldots

\section{Method}

We investigate \ldots

\subsection{Sample Preparation}

\subsection{Data Collection}

\section{Results}

\section{Conclusion}

\end{document}
```

### 1 Introduction

The problem of ...

### 2 Method

We investigate ...

#### 2.1 Sample Preparation

#### 2.2 Data Collection

### 3 Results

### 4 Conclusion

## 4 Structuring a document

# Table of contents

- ▶ `\tableofcontents` uses the location of the structuring commands (eg. `\page`, `\chapter`, `\section` etc) to build a table of contents
- ▶ Insert the `\tableofcontents` command after the `\maketitle` command
  - ▶ May need to compile your document twice in order to see the complete table of contents

### Contents

1	Who was Pythagoras?	1
2	What is the Pythagorean theorem?	1
3	How is the Pythagorean theorem useful?	2

# Summary

- ▶ History of LaTeX
- ▶ Basics of LaTeX: comments, special characters, whitespace
- ▶ Creating a LaTeX document
  - ▶ `\documentclass`
  - ▶ Environments
  - ▶ Structuring documents
  - ▶ Quotes, dashes, basic formatting