CSE 376: Technical Writing and Presentation

LaTeX Practicals

Prepared from LaTeX for Beginners, University of Edinburgh.

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Introduction

What is LaTeX?

LaTeX (pronounced *lay-tek*) is a document preparation system for producing professional-looking documents, it is **not** a word processor. It is particularly suited to producing long, structured documents, and is very good at typesetting equations. It is available as free software for most operating systems.

LaTeX is based on TeX, a typesetting system designed by Donald Knuth in 1978 for high quality digital typesetting. 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.

If you are used to producing documents with Microsoft Word, you will find that LaTeX is a very different style of working. Microsoft Word is 'What You See Is What You Get' (WYSIWYG), this means that you see how the final document will look as you are typing. When working in this way you will probably make changes to the document's appearance (such as line spacing, headings, page breaks) as you type. With LaTeX you do not see how the final document will look while you are typing it — this allows you to concentrate on the content rather than appearance.

A LaTeX document is a plain text file with a .tex file extension. It can be typed in a simple text editor such as Notepad, but most people find it easier to use a dedicated LaTeX editor. As you type you mark the document structure (title, chapters, subheadings, lists etc.) with tags. When the document is finished you compile it — this means converting it into another format. Several different output formats are available, but probably the most useful is Portable Document Format (PDF), which appears as it will be printed and can be transferred easily between computers.

Before You Start

The following conventions are used throughout the Practical sheets:

- Actions for you to carry out are bulleted with an arrow ➲.
- `Text you type is written in this font`.
- Menu commands and button names are shown in **bold**.

Practical 1: Document Structure

1.1 Essentials

➲ Start TeXworks.

A new document will automatically open.

➲ Go to the **Format** menu and select **Line Numbers**.

Line numbers are not essential, but will make it easier to compare your code with the screenshots and find errors.

➲ Go to the **Format** menu and select **Syntax Coloring**, then **LaTeX**.

Syntax colouring will highlight commands in blue and can make it easier to spot mistakes.

➲ Type the following:

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

\begin{document}

A sentence of text.

\end{document}
```

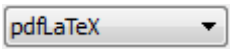
The `\documentclass` command must appear at the start of every LaTeX document. The text in the curly brackets specifies the document class. The **article** document class is suitable for shorter documents such as journal articles and short reports. Other document classes include **report** (for longer documents with chapters, e.g. PhD theses), **proc** (conference proceedings), **book** and **slides**. The text in the square brackets specifies options — in this case it sets the paper size to A4 and the main font size to 12pt.

The `\begin{document}` and `\end{document}` commands enclose the text and commands that make up your document. Anything typed before `\begin{document}` is known as the preamble, and will affect the whole document. Anything typed after `\end{document}` is ignored.

The empty lines aren't necessary[1], but they will make it easier to navigate between the different parts of the document as it gets longer.

- ➲ Click on the **Save** button. 
- ➲ Create a new folder called **LaTeX Practicals** in **Documents**.
- ➲ Name your document **Lab1** and save it as a **TeX document** in this folder.

It is a good idea to keep each of your LaTeX documents in a separate folder as the compiling process creates multiple files.

- ➲ Make sure the typeset menu is set to **pdfLaTeX**. 

- ➲ Click on the **Typeset** button. 

There will be a pause while your document is being converted to a PDF file. When the compiling is complete TeXworks' PDF viewer will open and display your document. The PDF file is automatically saved in the same folder as the .tex file.

[1]See section 2.5 for information about how LaTeX deals with empty space in the .tex file.

1.2 Troubleshooting

If there is an error in your document and TeXworks cannot create the PDF the **Typeset** button will change to red with a white X (**Abort typesetting** button) and the **Console output** at the bottom of the screen will stay open. If this happens:

- ➲ Click on the **Abort typesetting** button. 
- ➲ Read the **Console output** - the last line will probably include a line number and the command that caused the error.
- ➲ Go to the line number in your document and fix the error.
- ➲ Click on the **Typeset** button again.

1.3 Creating a Title

The `\maketitle` command creates a title. You need to specify the title of the document. If the date is not specified today's date is used. Author is optional.

- ➲ Type the following directly after the `\begin{document}` command:

```
\title{My First Document}
\author{My Name}
\date{\today}
\maketitle
```

Your document should now look like figure 1.

- ➲ Click on the **Typeset** button and check the PDF.

Points to note:

- `\today` is a command that inserts today's date. You can also type in a different date, for example `\date{December 2018}`.
- **Article** documents start the text immediately below the title on the same page. **Reports** put the title on a separate page (like this Practical Sheet).

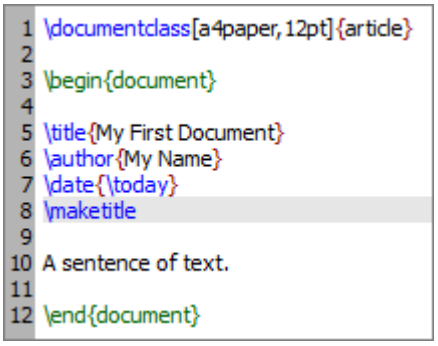


Figure 1: TeXworks screenshot showing the maketitle command.

1.4 Sections

You should divide your document into chapters (if needed), sections and subsections. The following sectioning commands are available for the **article** class:

- `\section{...}`
- `\subsection{...}`
- `\subsubsection{...}`
- `\paragraph{...}`
- `\subparagraph{...}`

The title of the section replaces the dots between the curly brackets. With the **report** and **book** classes we also have `\chapter{...}`.

➲ Replace "`A sentence of text.`" with the following:

```
\section{Introduction}
This is the introduction.

\section{Methods}

\subsection{Stage 1}
The first part of the methods.
```

```
\subsection{Stage 2}
The second part of the methods.

\section{Results}
Here are my results.
```

Your document should now look like figure 2.

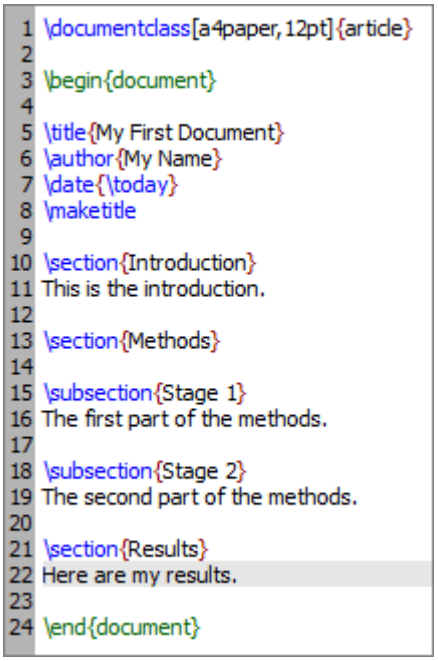


Figure 2: TeXworks screenshot of document with sections.

➲ Click on the **Typeset** button and check the PDF.

1.5 Labelling

You can label any of the sectioning commands so they can be referred to in other parts of the document. Label the section with `\label{labelname}`. Then type `\ref{labelname}` or `\pageref{labelname}`, when you want to refer to the section or page number of the label.

➲ Type `\label{sec1}` on a new line directly below `\subsection{Stage 1}`.

➲ Type `Referring to section \ref{sec1} on page \pageref{sec1}` in the **Results** section.

Your document should now look like figure 3.

```
1  \documentclass[a4paper,12pt]{article}
2
3  \begin{document}
4
5  \title{My First Document}
6  \author{My Name}
7  \date{\today}
8  \maketitle
9
10 \section{Introduction}
11 This is the introduction.
12
13 \section{Methods}
14
15 \subsection{Stage 1}
16 \label{sec1}
17 The first part of the methods.
18
19 \subsection{Stage 2}
20 The second part of the methods.
21
22 \section{Results}
23 Here are my results. Referring to section \ref{sec1} on page \pageref{sec1}
24
25 \end{document}
```

Figure 3: TeXworks screenshot of document with labels.

➲ Click on the **Typeset** button and check the PDF. You may need to typeset the document twice before the references appear in the PDF.

1.6 Table of Contents

If you use sectioning commands it is very easy to generate a table of contents. Type `\tableofcontents` where you want the table of contents to appear in your document — often directly after the title page.

You may also want to change the page numbering so that roman numerals (i, ii, iii) are used for pages before the main document starts. This will also ensure that the main document starts on page 1. Page numbering can be switched between arabic and roman using `\pagenumbering{...}`.

➲ Type the following on a new line below `\maketitle`:

```
\pagenumbering{roman}
\tableofcontents
\newpage
\pagenumbering{arabic}
```

The `\newpage` command inserts a page break so that we can see the effect of the page numbering commands. The first 14 lines of code should now look like figure 4.

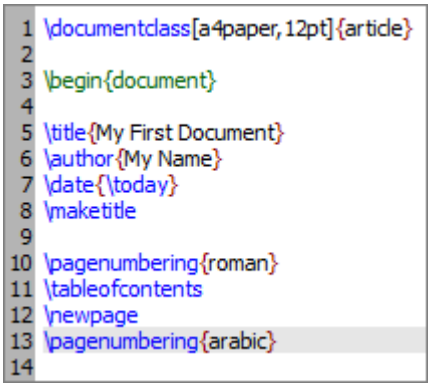


Figure 4: TeXworks screenshot of document showing table of contents command.

➲ Click on the **Typeset** button and check the PDF.

Checkpoint 1

When all the tasks are done, show your final tex file and pdf file to your instructor.