MAS116/MAS117 Presentation Lecture 2: LaTeX

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1: The general philosophy of LaTeX

LaTeX is a ‘mark-up’ language.

You ‘mark-up’ your content to tell LaTeX how it should be treated.

- For **emphasised text** you type `\emph{emphasised text}`.
- For a section title you type `\section{...}`.

You do **not** decide how these things are actually displayed.

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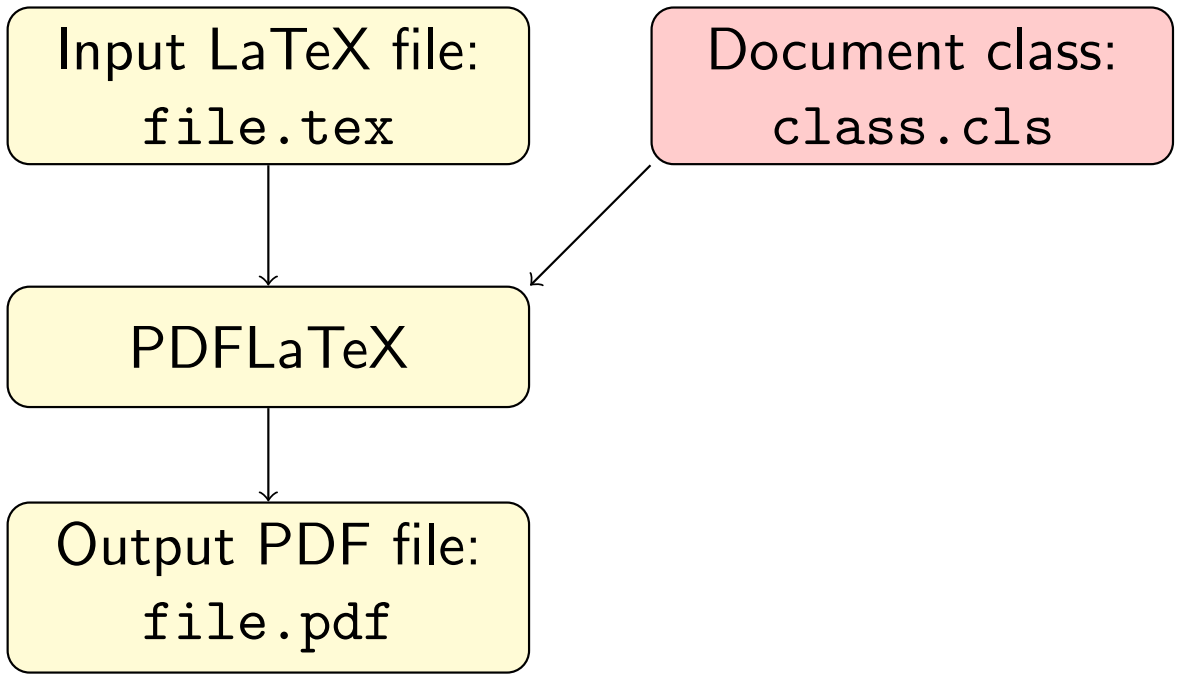
Such formatting, or style, decisions are kept in a **document class** file.

Style and content are kept separate.

- We use the American Mathematical Society article class, `amsart`.
- The slides of this presentation use the Beamer class.

LaTeX process schematic 1



Why keep style and content separate?

- It ensures consitency throughout a document (and a series).
- Untrained people (you) often make bad document design decisions.
- Class files are written by professional designers (typographers).
- The result is usually better looking documents.
- It allows you (the author) to concentrate purely on the content.

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We will see in Week 8 that webpages are written in the same way.

You have HTML files for content and CSS files for style.

Altering the style: using class options

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Class options appear in the `\documentclass` command.

For example,

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\documentclass[11pt, a4paper]{amsart}
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Note that `a4paper` in `amsart` gives seemingly wide margins on the page.

Documents are most readable when there is 60–75 characters per line.

Professional document class designers (typographers) know this.

Untrained folk would opt for much longer, less readable lines of text.

Altering the style: using packages

Packages are extra programs that add extra features or alter things.

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Eg, there are two standard ways to mark the begining of a paragraph.

(i) Either put in some blank, vertical space, or,

(ii) indent the first line.

In `amsart` the default is the second of those.

To switch the first you put the following in your preamble.

```
\usepackage{parskip}
```

Tweaking the layout should be kept to a minimum.

It is easy to make the document look worse.

Aside: Paragraphs

Documents are made up of sentences inside paragraphs inside sections.

In LaTeX,

- change of sentence is indicated with a full-stop;
- change of paragraph is indicated by **having an empty line**;
- change of section is indicated with a `\section{..}`.

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- change of paragraph is indicated by **having an empty line**;
- change of section is indicated with a `\section{..}`.

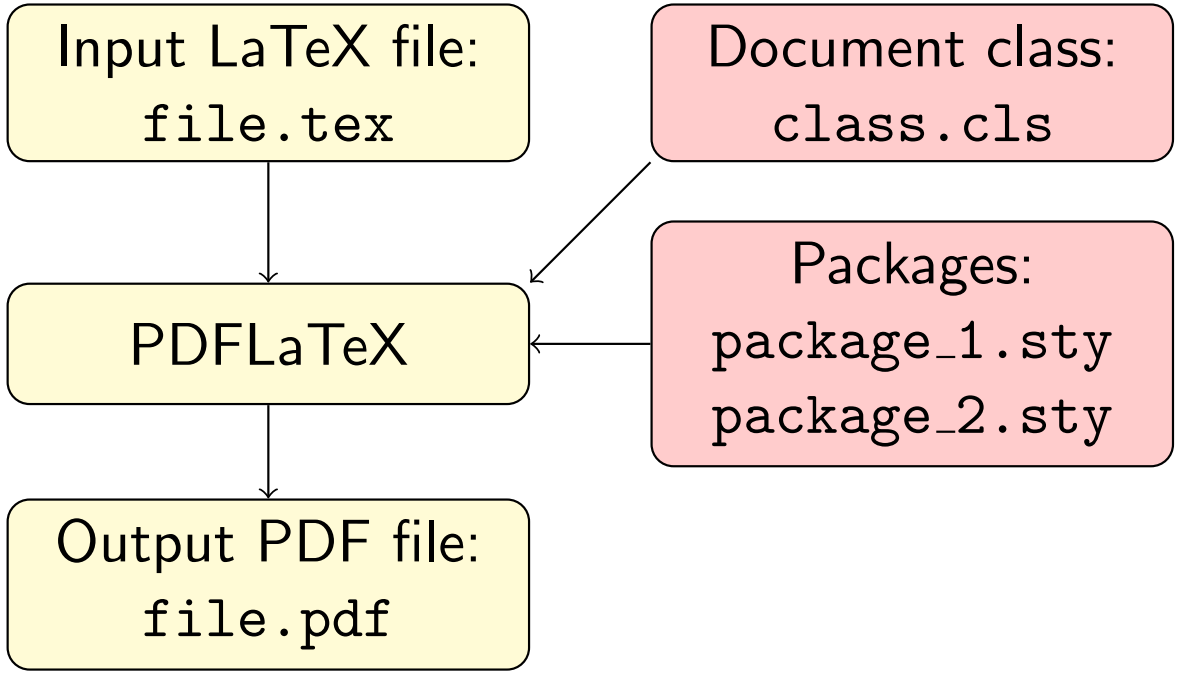
So, two paragraphs will look like this in a LaTeX document.

```
Paragraph 1 starts here... blah blah blah blah
blah blah blah blah blah blah blah blah blah

Paragraph 2 starts here... blah blah blah blah
blah blah blah blah blah blah blah blah blah
```

LaTeX will then display the two chunks of text as separate paragraphs.

LaTeX process schematic 2



2: Activity time

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Activity.

Look at the two circulated documents which have the same LaTeX code, but differ in their preamble.

In pairs or threes, find at least five differences in how the document displays and discuss which one you prefer.

Also count an average line-length for each document.

Do you have strong opinions about margins?

3: Text versus mathematics

Typography

> **Typography** *is the art and technique of arranging type to make written language legible, readable and appealing when displayed. The arrangement of type involves selecting typefaces, point sizes, line lengths, line spacing, letter spacing, and spaces between pairs of letters. [Wikipedia]*

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The actual process of positioning letters and punctuation according to typographical rules is called **typesetting**.

Both general typographical rules and information in the document class will determine how LaTeX does its typesetting.

There can be many subtle things happening, such as **ligatures**.

These are where letters are combined to a single symbol, as in Sheffield.

Text versus mathematics

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The typography of mathematics is a completely different thing!

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Lots of rules go in to typesetting complicated mathematics.

$$\int_{t\in\mathbb{R}} e^{\frac{i\pi}{t}}\,dt = \lim_{x\to 0}\frac{n!\sin(x)}{x+x^2}$$

Using maths mode

In order to know whether to use the rules for English or maths, LaTeX needs to know whether your content is English or maths.

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	LaTeX	Output
Right	`The variable $x$`	The variable x
Wrong!	`The variable x`	The variable x
Right	`We have $\sin(x)=1$.`	We have $\sin(x) = 1$.
Wrong!	`We have sin(x)=1.`	We have sin(x)=1.

4: Obtaining LaTeX

Installing LaTeX

In order to use LaTeX on a computer, you need various things:

(i) software to edit LaTeX files and display PDF files, eg. TeXworks;

(ii) the PDFLaTeX program;

(iii) all of the document class files and package files.

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Alternatively, you can just use a browser.

- Cloud-based: visit Overleaf at `http://www.overleaf.com`.

5: This afternoon...

Computer Lab 2

In Computer Lab 2, we will develop more of the LaTeX commands that you'll be needing to write documents.

For example, we'll look at

- how
- to
- create
- lists

and how to typeset things like

$$\Gamma(x) \equiv \lim_{x \to 0} \prod_{v=0}^{n-1} \frac{n!\, n^{x-1}}{x+v}.$$

Don't forget that you need to hand-in a printout of your homework at the start of the lab.