MPS115/MPS116 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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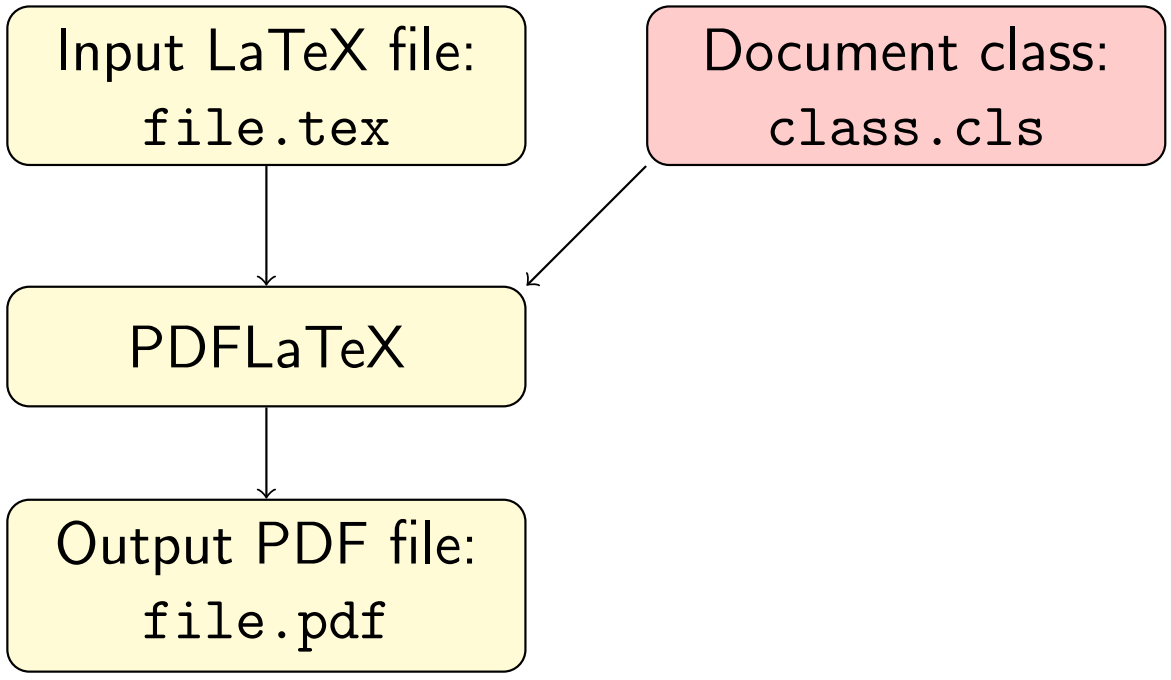
Such formatting, or style, decisions are kept in a **document class** file.

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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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

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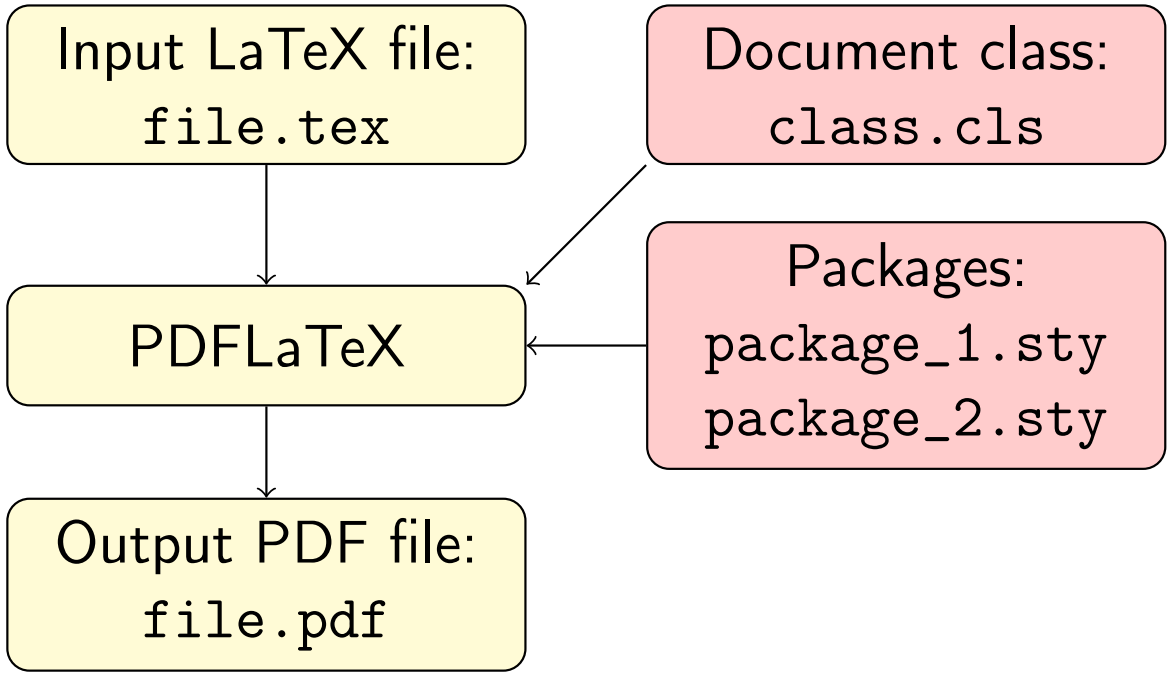
```
\documentclass[a4paper, 11pt]{amsart}

% This part is called the preamble
% A %-sign means the line is a comment and ignored

\usepackage{hyperref}

\author{A. Student}
\title{My Document}

\begin{document}
...
```

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?

Some differences

	Document 1	Document 2
Font	larger	smaller
Paragraphs	empty line	indentation
Page numbers	at bottom of page	none
Emphasis	bold	italics
Section titles	different	different
Maths font	different	different

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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- variables are typeset in italic, a not a;
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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.