

# LaTeX

Further topics

# House Rules



No such thing  
as a silly  
question...

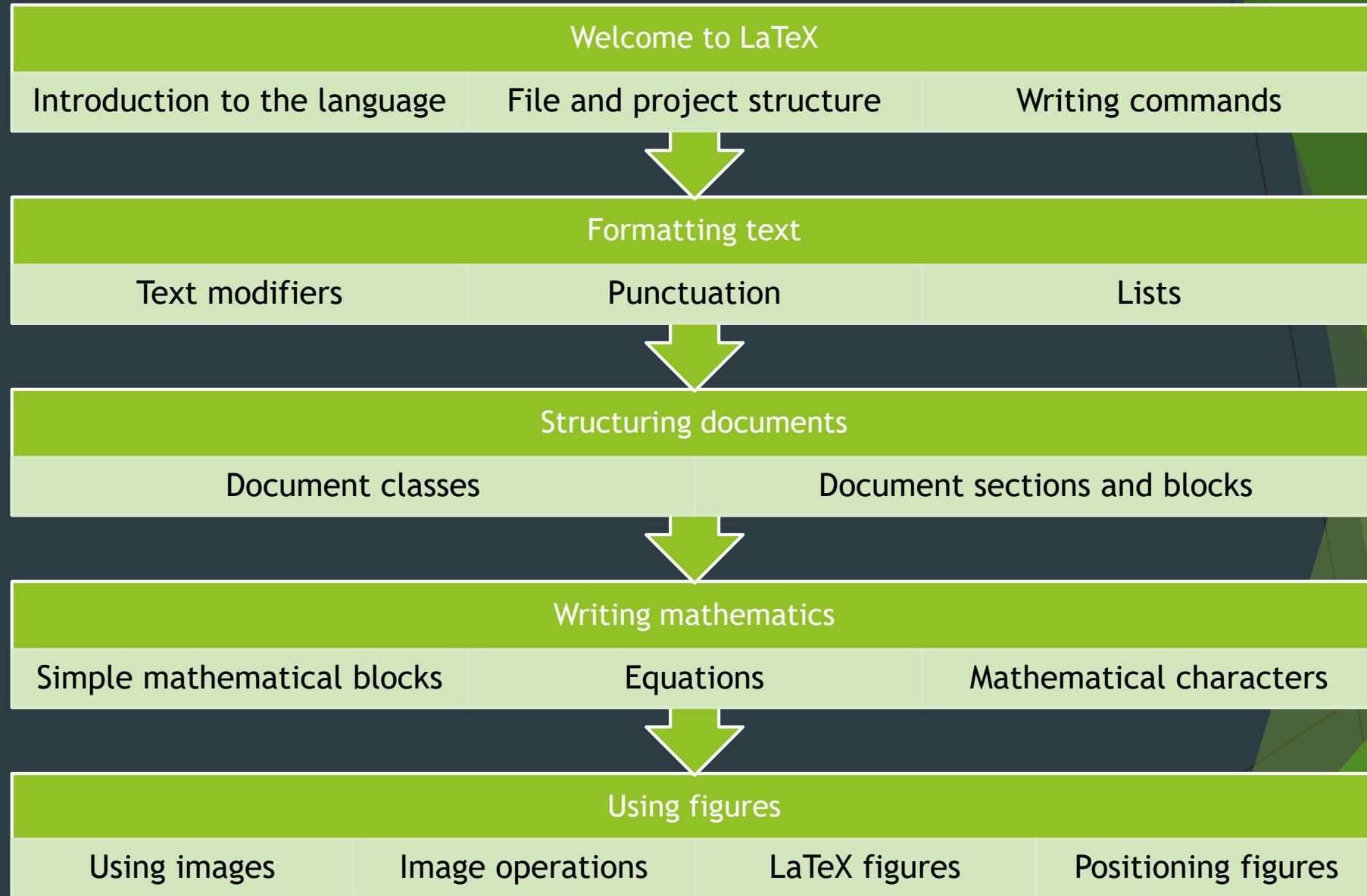


... so ask me  
at any  
point...



...but I may  
park questions  
for later

TOC



# Preamble

```
\documentclass[papersize, fontsize]{class}
    article | report | book

\title{title}
\author{author}
\date{\today}

\usepackage{setspace}
\spacing{1.6} %doublespace

% article - papers
% report - chaptered document
% book - for a book or thesis structure

%paper size: often a3paper, a4paper...

\usepackage{amsmath} %maths
\usepackage{amssymb} %maths symbols

\usepackage{graphicx}
\graphicspath{ {figures/} }
\DeclareGraphicsExtensions{.png,.pdf}
```

# Main Body

```
\begin{document}
\maketitle
Typed text is as written

\textrm{bold}, \textit{italic}, \textsuperscript{super},
\textsubscript{sub}, \textsc{SMALLCAPS}, \underline{ul}

` or `` to start quotes
- \textendash \textemdash

tiny, scriptsize, footnotesize, small, normalsize, large,
Large, LARGE, huge, Huge

\begin{flushleft}           {center}           {flushright}
\end{...}

\begin{itemize|enumerate|description}[A.][i.] %lettered/roman
    \item bullet or numbered item
    \item[\label] for description item

\begin{part|chapter|abstract}
\section{name} \subsection{} \subsubsection{} \paragraph{}
\subparagraph{}

\includegraphics[width|height|scale|angle|clip]{filename}

\begin{figure}[position]
    \centering
    \includegraphics[]{...}
    \caption{caption text}
\end{figure}

\end{document}
```

# Non-Textual

```
\command[options]{context}
#, $, %, ^, &, _, {, }, ~, \ are reserved
Multiple consecutive spaces = one space
2+ consecutive newlines = new paragraph

This is $inline$ maths
$$block maths$$
\begin{equation}
    equation
\end{equation}

^{maths superscript}
_{maths subscript}

"\ " - maths whitespace

\left( \left[ \left\{ \right. \right) ...
image units: \textwidth \columnwidth mm pt
cm em...

\includegraphics[clip=true, trim left bot
right top]{imagepath}

\includegraphics[angle=45]{imagepath}

\setlength\fboxrule{2pt} %border thickness
\fbox{\includegraphics...}

[h|t|b|p||H] - here, top, bottom,
own page, override!, HERE!
```

# Further Page Elements

Tables, Automated Meta-Sections, and additional font options

# Text modifiers

```
\textbf{bold} Caps  
\textit{italic} \underline{lin  
ed}  
\textsuperscr \textsf{sans  
ipt{uper} serif face}  
\textsubscript \textrf{roman  
t{ub} / serif face}  
\Large{size} \texttt{typewr  
iter font}  
\textmdash ``'\'' \textcolor{red  
}{colour}  
\textsc{Small
```

**bold**

*italic*

S<sup>uper</sup>

S<sub>ub</sub>

size

— “”

SMALL CAPS

lined

sans serif face

roman

typewriter font

colour

# Colours

## Color

- ▶ `\usepackage{color}`
- ▶ Basic colors:
  - ▶ Red, blue, green, white, black, yellow, cyan , magenta...
- ▶ Simple Web and print-safe options

## XColor

- ▶ `\usepackage[dvipnames]{xcolor}`
- ▶ Wider range of colour options
- ▶ All generally print-safe
- ▶ Usually the standard package used for colours
- ▶ Calls the DVIP driver colour names

# Xcolor DVIP colours

Apricot	Emerald	OliveGreen	RubineRed	
Aquamarine	ForestGreen	Orange	Salmon	
Bittersweet	Fuchsia	OrangeRed	SeaGreen	
Black	Goldenrod	Orchid	Sepia	
Blue	Gray	Peach	YellowOrange	
BlueGreen	Green	Periwinkle	SkyBlue	
BlueViolet	GreenYellow	PineGreen	SpringGreen	
BrickRed	JungleGreen	Plum	Tan	
Brown	Lavender	ProcessBlue	TealBlue	
BurntOrange	LimeGreen	Purple	Thistle	
CadetBlue	Magenta	RawSienna	Turquoise	
CarnationPink	Mahogany	Red	Violet	
Cerulean	Maroon	RedOrange	VioletRed	
CornflowerBlue	Melon	RedViolet	White	
Cyan	MidnightBlue	Rhodamine	WildStrawberry	
Dandelion	Mulberry	RoyalBlue	Yellow	
DarkOrchid	NavyBlue	RoyalPurple	YellowGreen	

# Using colour

- ▶ `\textcolor{red}{this is inline text}`
- ▶ `\colorbox{red}{this has a red background}`

Any environment can set its text colour with:

```
\begin{itemize}  
\color{orange}  
\item orange text  
\end{itemize}
```

```
{\color{Rhodamine} everything in  
these braces\\ is one environment}
```

this is inline text

this has a red background

- orange text

everything in these braces  
is one environment

# Making your own colours

- ▶ Faded colours:
  - ▶ `\textcolor{Cerulean!50}{50\% white}`
- ▶ Mixed colours:
  - ▶ `\textcolor{Creulean!50!Magenta}{50\% Magenta}`
- ▶ Defined colours:
  - ▶ `\definecolor{name}{rgb|RGB|cmyk|grey}{values} % preamble`
  - ▶ `\textcolor{name}{text}`

# Exercise: colours

- ▶ Emulate this:

50% Cerulean, 50% White

50 % Cerulean, 50% Magenta

red-green-blue by decimals: 0.8, 0.6, 0.2

red-green-blue by 0–255: 200, 50, 120

cyan-magenta-yellow-key by decimals: 0.8, 0.1, 0.1, 0.2

greyscale colour by decimals: 60%

# Exercise: colours

```
\definecolor{rgb_colour1}{rgb}{0.8,  
0.6, 0.2}  
  
\definecolor{rgb_colour2}{RGB}{200,  
50, 120}  
  
\definecolor{cmyk_colour}{cmyk}{0.8,  
0.1, 0.1, 0.2}  
  
\definecolor{greyscale}{gray}{0.6}
```

50% Cerulean, 50% White

50 % Cerulean, 50% Magenta

red-green-blue by decimals: 0.8, 0.6, 0.2

red-green-blue by 0–255: 200, 50, 120

cyan-magenta-yellow-key by decimals: 0.8, 0.1, 0.1, 0.2

greyscale colour by decimals: 60%

# Exercise: colours

```
\textcolor{Cerulean!50}{50\%  
Cerulean, 50\% White}  
  
\textcolor{Cerulean!50!Magenta}{50  
\% Cerulean, 50\% Magenta}  
  
\textcolor{rgb_colour1}{red-green-  
blue by decimals: 0.8, 0.6, 0.2}  
  
\textcolor{rgb_colour2}{red-green-  
blue by 0\textendash 255: 200, 50,  
120}  
  
\textcolor{cmyk_colour}{cyan-  
magenta-yellow-key by decimals:  
0.8, 0.1, 0.1, 0.2}  
  
\textcolor{greyscale}{greyscale  
colour by decimals: 60\%}
```

50% Cerulean, 50% White  
50 % Cerulean, 50% Magenta  
red-green-blue by decimals: 0.8, 0.6, 0.2  
red-green-blue by 0–255: 200, 50, 120  
cyan-magenta-yellow-key by decimals: 0.8, 0.1, 0.1, 0.2  
greyscale colour by decimals: 60%

# Fonts



## Serif fonts

Contain details and tails to letters (serifs)  
Helpful for reading printed material



## Sans-Serif fonts

Contain no serifs  
Typically better for screen-viewing



## Typewriter fonts

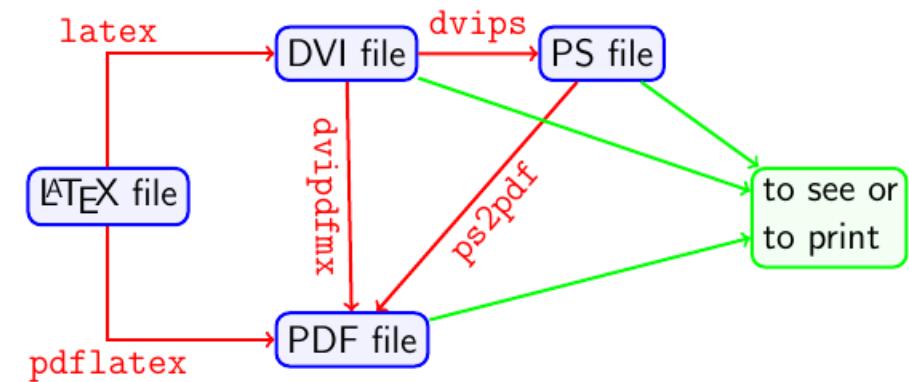
Typically monospaced  
Good for emphasis and ensuring every character is fully legible - e.g. code

# Additional fonts

- ▶ Default family of LaTeX fonts are the “*Computer Modern*” fonts
- ▶ Loaded as packages in the preamble
  - ▶ `\usepackage{fontfamilyname}`
- ▶ Can be switched to in the body:
  - ▶ `{\fontfamily{font-code}\selectfont ...text...}`
- ▶ Not all fonts are supported
- ▶ See <https://tug.org/FontCatalogue/>

# A detour on compilers

- ▶ The base compiler is TeX
- ▶ Additional variants exist for further functionality in image and font support and document rendering



# Compilers?



Additional  
resources



.tex  
document



Output  
document

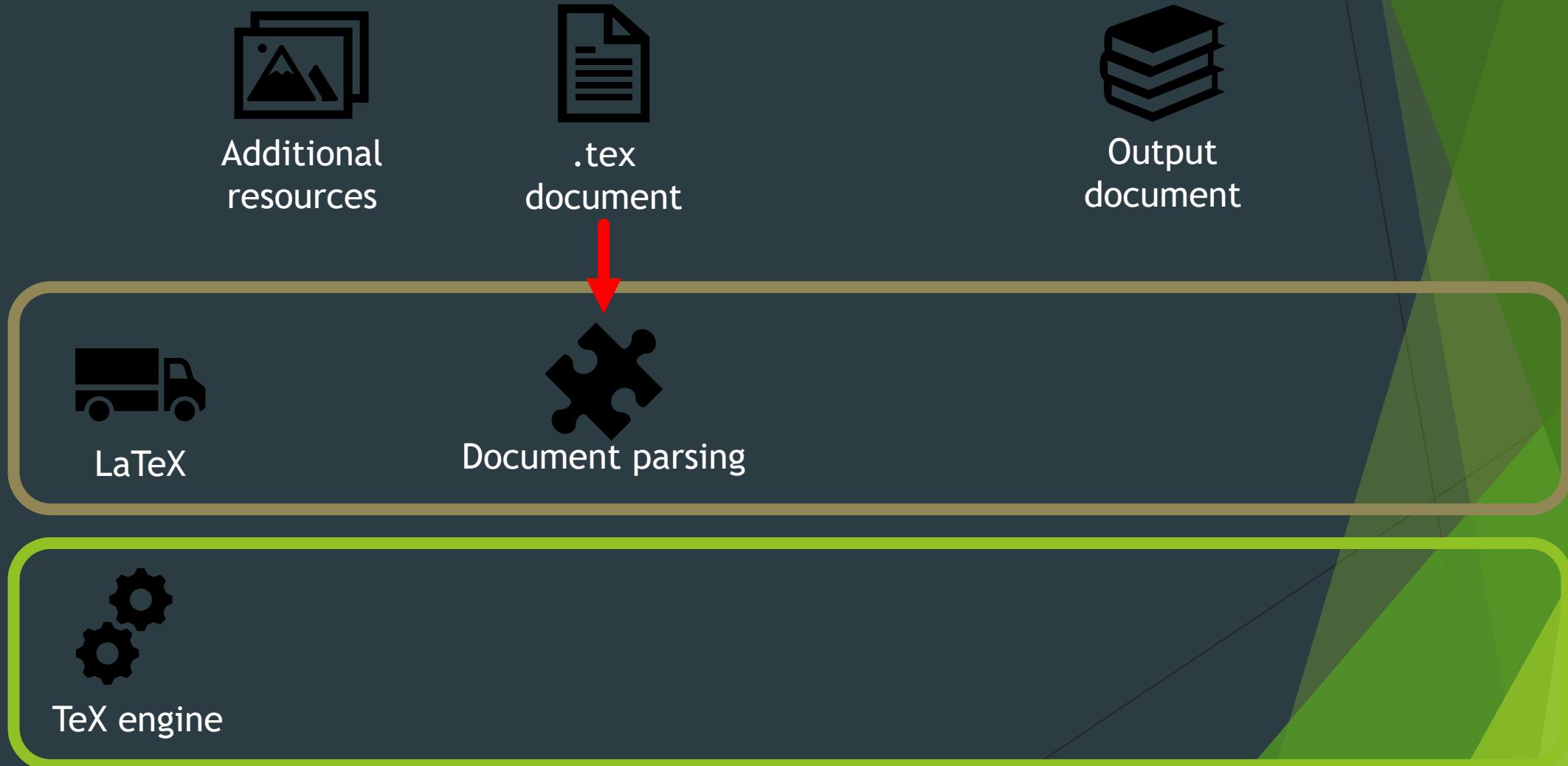


LaTeX

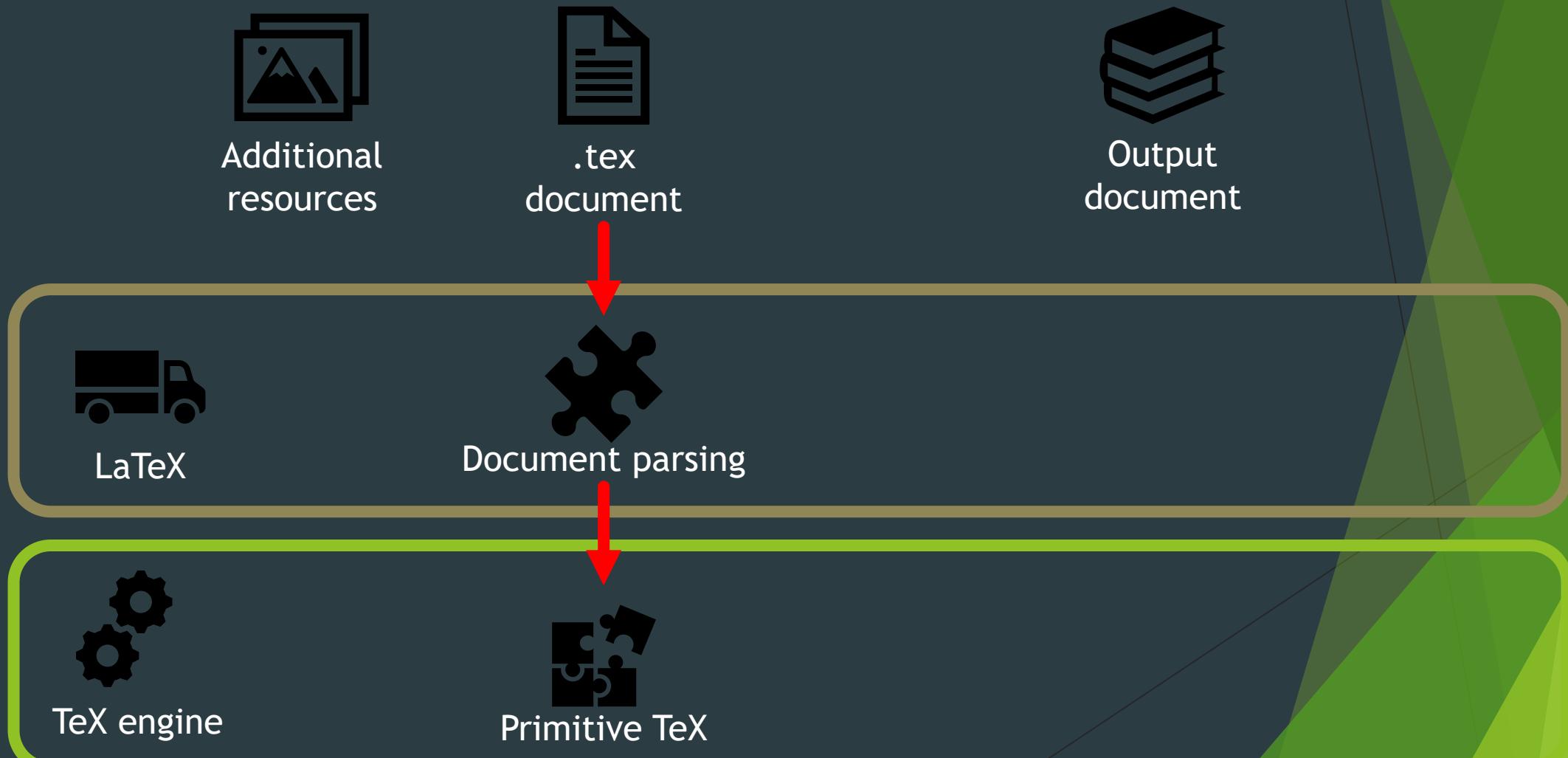


TeX engine

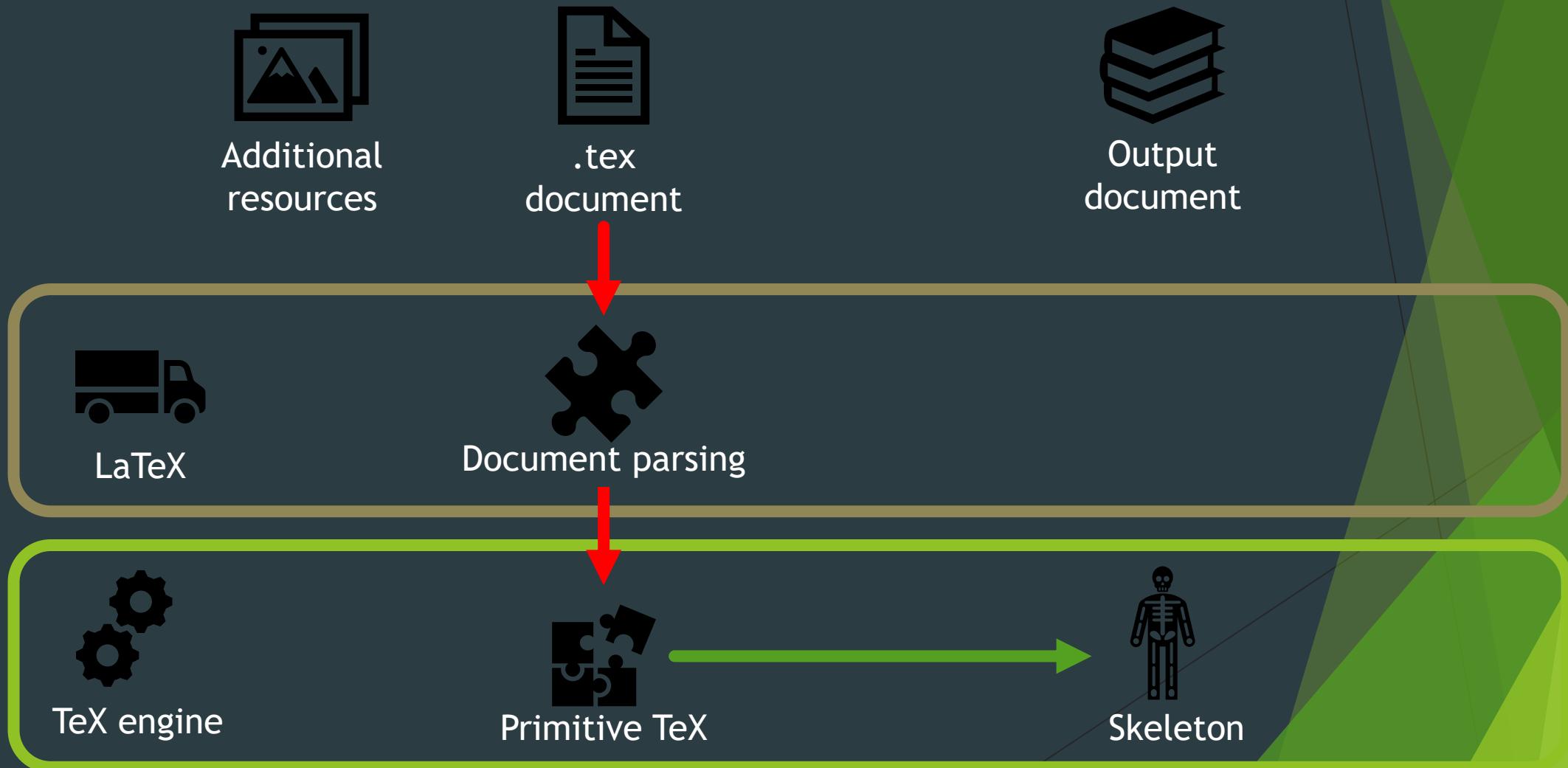
# Compilers?



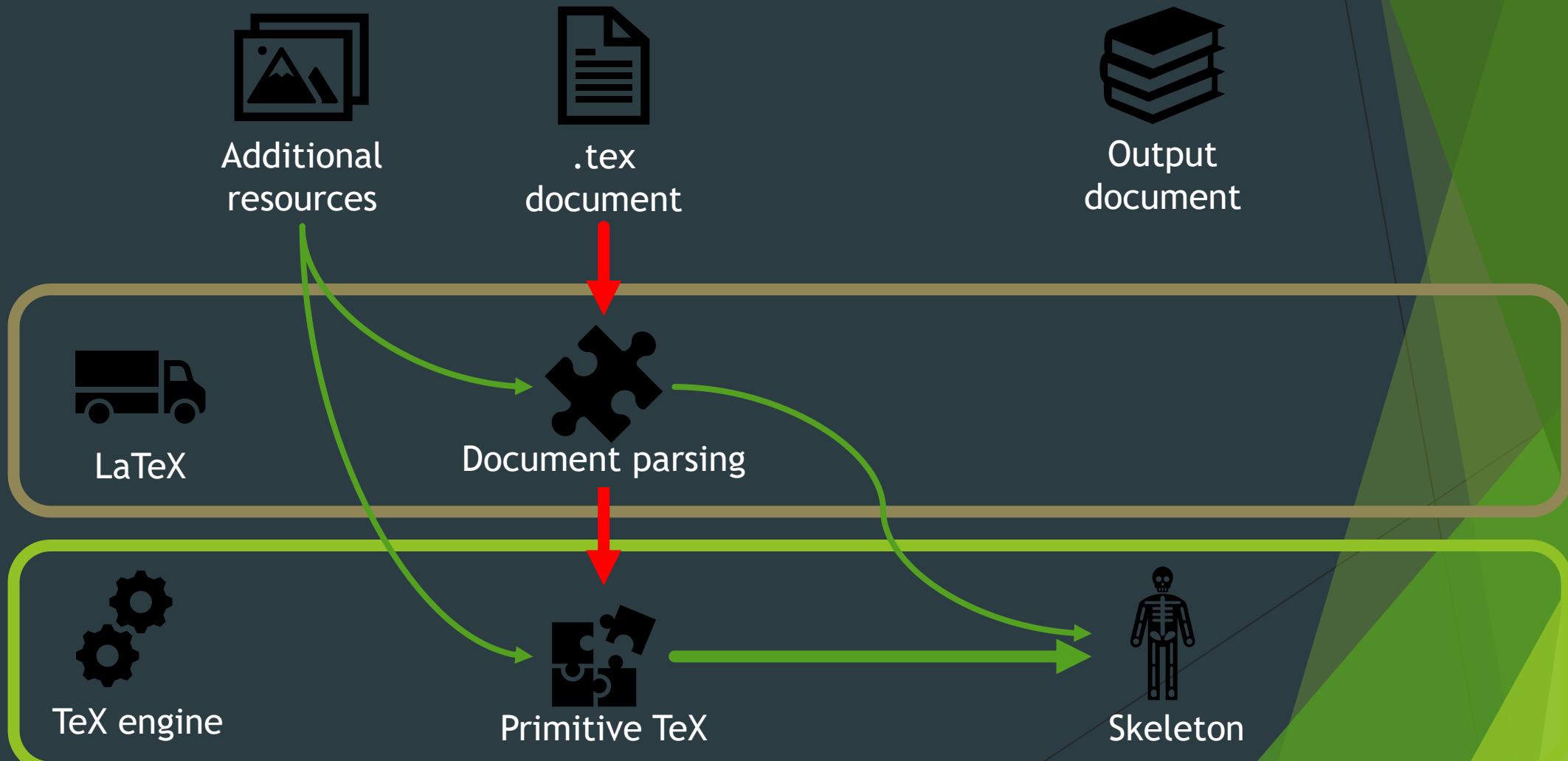
# Compilers?



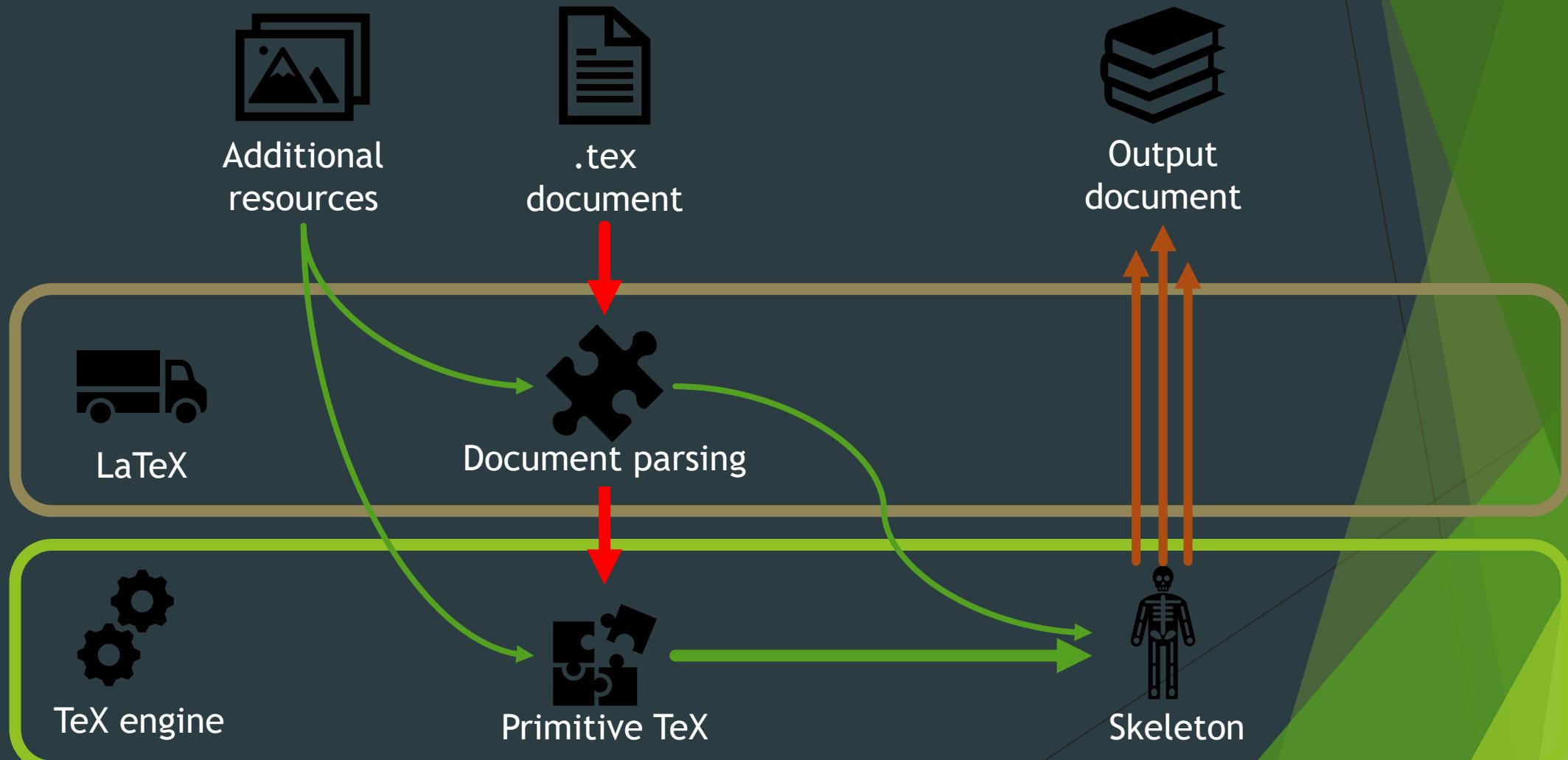
# Compilers?



# Compilers?

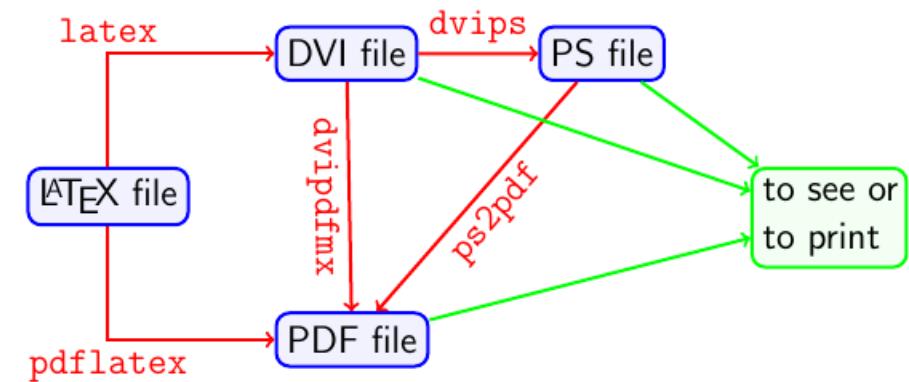


# Compilers?



# A detour on compilers

- ▶ The base TeX compiler is LaTeX
- ▶ Additional variants exist for further functionality in image and font support and document rendering



# TeX Variants



## pdfLaTeX

A extension to TeX that renders documents as pdfs before display

The default compiler for LaTeX as it provides better image support than bare TeX



## XeTeX / XeLaTeX

eXtensible TeX / LaTeX

Support all core image types

Extended package support and wider font support



## LuaTeX

Similar to XeLaTeX in extensibility, allows advanced control of document creation with Lua

# XeLaTeX



Not standard on Overleaf but can be enabled



Provides strong support for non-Latin alphabets



Standard for complex typographic documents



Beyond the scope of this series, but well documented

# Standard typographic packages

## Babel

- used for international language support
- \usepackage[english]{babel}
- \usepackage[ancientgreek, farsi]{babel}

## Inputenc

- used to specify the encoding of the document – how the computer saves characters on a bit-wise level.
- Modern computing (and XeLaTeX) uses UTF8, but LaTeX doesn't use it as standard. Helpful to explicitly set.
- \usepackage[utf8]{inputenc}

# Labelling



Provides a way to reference sections and elements in your document



Allows smart referencing



Provides meta-information to LaTeX for auto-generated sections

# Labels in your document

`\label{your_label_text}`

- ▶ Can be placed inside a figure, equation or other element
  - ▶ `\begin{figure}`  
`\label{myfigureLabel}`  
... `\end{figure}`
- ▶ Can be placed next to a document structure statement
  - ▶ `\section{sectionname}`  
`\label{mysectionLabel}`

# Labels in practice

```
\section{Methodology}  
\label{section: methodology}  
  
\begin{itemize}  
\label{list: teas}  
  \item Assam  
  \item Darjeeling  
\end{itemize}
```

This is a reference to section \ref{section: methodology} with a list of teas on page \pageref{list: teas}

## 1 Methodology

- Assam
- Darjeeling

This is a reference to section 1 with a list of teas on page 1

# Automated Meta- sections

Tables of contents

Lists of figures

Lists of tables

Bibliographies

Glossaries

Indexes

Nomenclatures

```
\renewcommand*\contentsname{summary}
% preamble

\tableofcontents

\section{this appears in the TOC}

\addcontentsline{toc}{section}{a section
title}

\section*{this doesn't, and isn't numbered}
```

# Table of Contents

```
\renewcommand{\listfigurename}{List of  
plots}
```

```
\renewcommand{\listtablename}{Tables}
```

```
\listoffigures  
\listoftables
```

Note: Your figures MUST have a caption to appear or be referenced anywhere, as the caption generates the fig or table number, and to have text that appears in the list.

## List of figures or tables

# Tables



Defined by the tabular environment



Automatically align and shift spacing to best display the information in the cells



Can be slow and tedious



Consider using a generator online for larger tables



Alignment uses the & character

# Tables in LaTeX

```
\begin{table}[h!]
\centering
\begin{tabular}{c c c}
header 1 & header 2 & header 3 \\
value 1 & value 2 & value 3 \\
value 4 & value 5 & value 6
\end{tabular}
\label{table: example}
\caption{example caption}
\end{table}
```

header 1	header 2	header 3
value 1	value 2	value 3
value 4	value 5	value 6

Table 1: example caption

# Styling columns

```
\begin{tabular}{c c c}
```

- ▶ The {c c c} defines the justification and style of the columns:
  - ▶ { |c|c|c| } gives single vertically lined columns of centred text.
  - ▶ { |l|c|r| } gives a left-, centre- and right-justified column, respectively
  - ▶ { |c||c|c| } gives a double line between the 1<sup>st</sup> and 2<sup>nd</sup> columns

Horizontal lines can be created using `\hline` between your rows of cells

Like columns you can create double lines. Use the command twice to achieve this.

To add colours, use the `xcolor` package again.

```
\usepackage[dvipsnames, table]{xcolor}  
%preamble  
{\rowcolors{starting row}{colour1}{colour2}}  
\begin{table}...
```

## Styling rows

# Table style in practice

```
\documentclass{article}
\usepackage[dvipsnames, table]{xcolor}
\begin{document}
{\rowcolors{2}{green!80!yellow!50}{green!30!yellow!80}
\begin{table}[h!]
\centering
\begin{tabular}{|l||c|c|}
\hline
header 1 & header 2 & header 3 \\
\hline \hline
value 1 & value 2 & value 3 \\
value 4 & value 5 & value 6 \\
value 7 & value 8 & value 9 \\
\hline
\end{tabular}
\label{table: example}
\caption{example caption}
\end{table}
\end{document}
```

header 1	header 2	header 3
value 1	value 2	value 3
value 4	value 5	value 6
value 7	value 8	value 9

Table 1: example caption

## Exercise: tables

header 1	header 2	header 3	header 4
value 1	value 2	value 3	value 4
value 5	value 6	value 7	value 8
value 9	value 10	value 11	value 12
value 13	value 14	value 15	value 16

Table 1: Cerulean and pink colours

# Exercise: tables

```
\documentclass{article}
\usepackage[dvipsnames, table]{xcolor}

\begin{document}
{\rowcolors{4}{pink}{Cerulean}
\begin{table}[h!]
\centering
\begin{tabular}{l c || c r}
header 1 & header 2 & header 3 & header 4\\
\hline
value 1 & value 2 & value 3 & value 4 \\
value 5 & value 6 & value 7 & value 8 \\
\hline
value 9 & value 10 & value 11 & value 12 \\
\hline
value 13 & value 14 & value 15 & value 16 \\
\hline
\end{tabular}
\label{table: example}
\caption{Cerulean and pink colours}
\end{table}
}
\end{document}
```

header 1	header 2	header 3	header 4
value 1	value 2	value 3	value 4
value 5	value 6	value 7	value 8
value 9	value 10	value 11	value 12
value 13	value 14	value 15	value 16

Table 1: Cerulean and pink colours

# More on tables

- ▶ Much more can be achieved with tables in LaTeX:
  - ▶ Advanced colouring rules
  - ▶ merged columns
  - ▶ multipage tables
  - ▶ fixed-width column sizes
  - ▶ and more
- ▶ Requires additional packages (`tabularx`, `tabu`, `array`)

# Document layout

Document structure, layouts,  
multifile documents, headers  
and footers, columns, and  
spacings

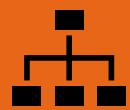
# Multi-file documents



To see even minor changes to a document, the .tex file needs to be recompiled and re-rendered.



For smaller articles, this is a trivial task, but as the document grows and more tables, images and reference links are added, the compute time grows exponentially



For larger documents, it is often better (and safer) to split parts away to separate .tex files.

# Two commands to adding .tex files

## Input

- ▶ `\input{filename.tex}`
- ▶ Formats according to the base file preamble
- ▶ Can be nested, with inputs to other files in the imported file
- ▶ Can be imported inline

## Include

- ▶ `\include{filename}`
- ▶ Formats according to the base file preamble
- ▶ Cannot be nested, but can include files with their own inputs
- ▶ Forces a page break

# Two packages to splitting files

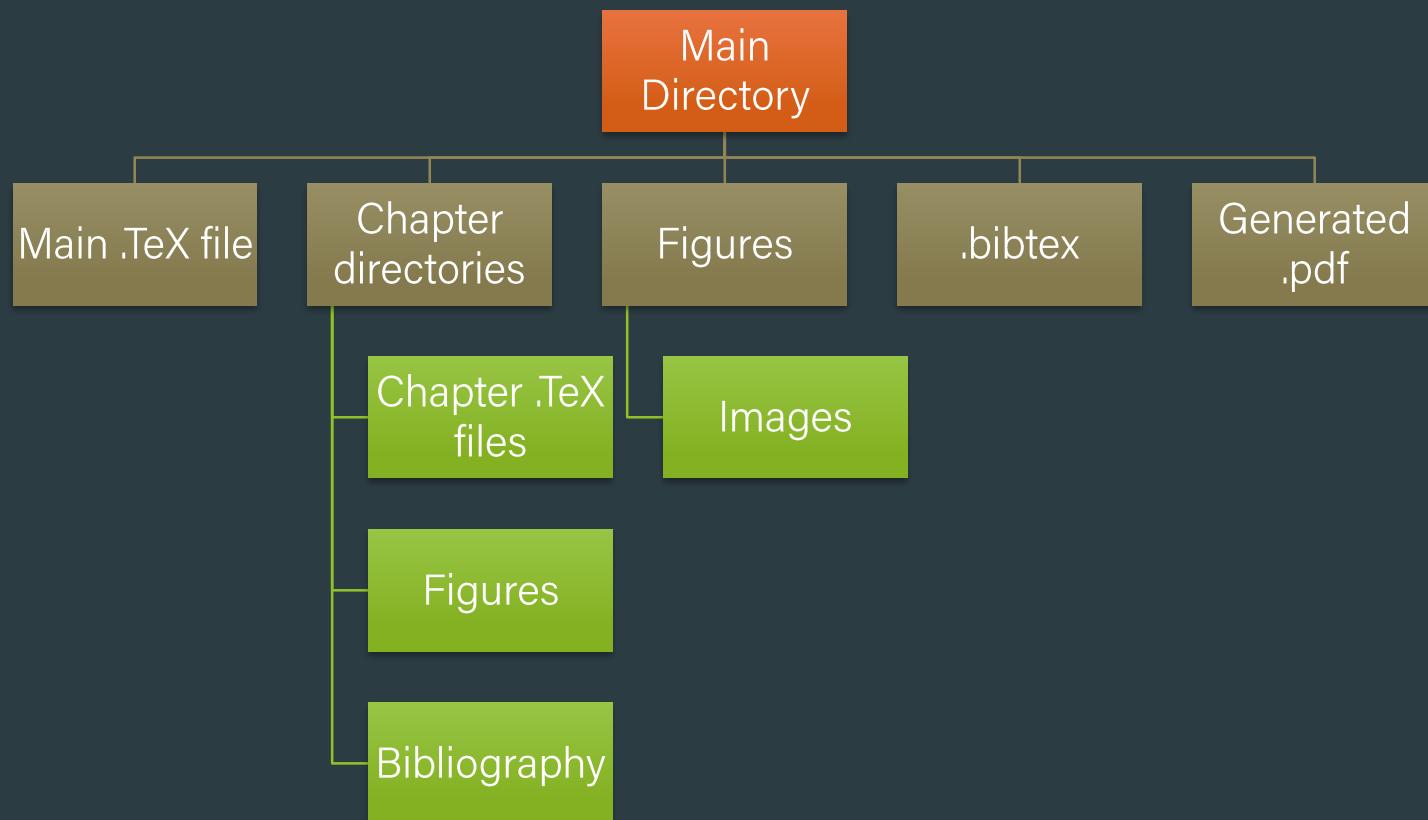
## Subfiles

- ▶ `\usepackage{subfiles}`  
`\subfile{filename}`
- ▶ Uses the main document's preamble
- ▶ Child documents start with:  
`\documentclass[main.tex]{subfiles}`
- ▶ All preamble statements occur in  
the main document

## Standalone

- ▶ `\usepackage{standalone}`  
`\input | \include`
- ▶ Uses each child's preamble
- ▶ Child documents start with:  
`\documentclass{standalone}`
- ▶ Each chapter's preamble is self-contained and isolated

# Hierarchy of a LaTeX project



# Line breaks and blank spaces

Multiple ways to add vertical negative spaces to your document. To break a line you can use:

- ▶ Newline-newline creates a new paragraph
- ▶ \\ creates an inline line-break, with no indentation.
- ▶ \newline is a more explicit version of \\ for text
- ▶ \hfill \break fills the rest of the line with space, and break adds a new line.

This is a simple sentence as a paragraph, wrapping automatically on to new lines. Each automatically returned line doesn't indent — only new paragraph lines indent. Two new lines will make a new indented paragraph.

This is the new paragraph. By using \\ I'll be able to linebreak without making it a strict new paragraph here ...

... great for forcing explicit line breaks without making it a strictly new paragraph.

I can also force the line to fill with \hfill \break ...  
... like this!

# Exercise

# Exercise

This is a simple sentence as a paragraph, wrapping automatically on to new lines. Each automatically returned line doesn't indent \textemdash \ only new paragraph lines indent. Two new lines will make a new indented paragraph.

This is the new paragraph. By using \textbackslash \textbackslash I'll be able to linebreak without making it a strict new paragraph here \textellipsis \\ \textellipsis great for forcing explicit line breaks without making it a strictly new paragraph.

I can also force the line to fill with \texttt{\textbackslash hfill \textbackslash break} \textellipsis \hfill \break \textellipsis like this!

This is a simple sentence as a paragraph, wrapping automatically on to new lines. Each automatically returned line doesn't indent — only new paragraph lines indent. Two new lines will make a new indented paragraph.

This is the new paragraph. By using \\ I'll be able to linebreak without making it a strict new paragraph here ...  
...great for forcing explicit line breaks without making it a strictly new paragraph.

I can also force the line to fill with \hfill \break ...  
...like this!

# Page breaks

Breaking a page is simple:  
There are two ways to  
explicitly make a new page:

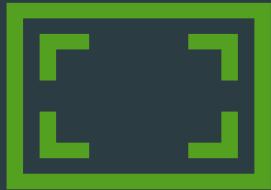
`\clearpage` makes a new page at that position in the text. Importantly, if there are any floating elements (e.g. figures) prior to the break, LaTeX displays them before the break.

`\newpage` makes a new page at that position in the text, but does not interfere with where LaTeX places any floating elements

# Paragraph styles

- ▶ The indentation and the gap between paragraphs can be set in the preamble with:
  - ▶ `\setlength{\parindent}{4em}`
  - ▶ `\setlength{\parskip}{1em}`
- ▶ The text can be stretched horizontally with:
  - ▶ `\renewcommand{\baselinestretch}{1.5}`

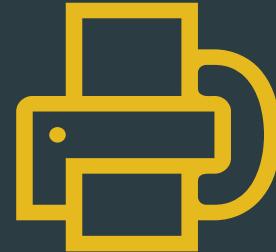
# Other spaces



## Horizontal spaces:

`\hspace{size}` makes a measured blank along a line

`\hfill` fills as much of the row as it can



## Vertical spaces:

`\vspace{size}` makes a measured blank down a page

`\vfill` fills as much of the vertical page as it can

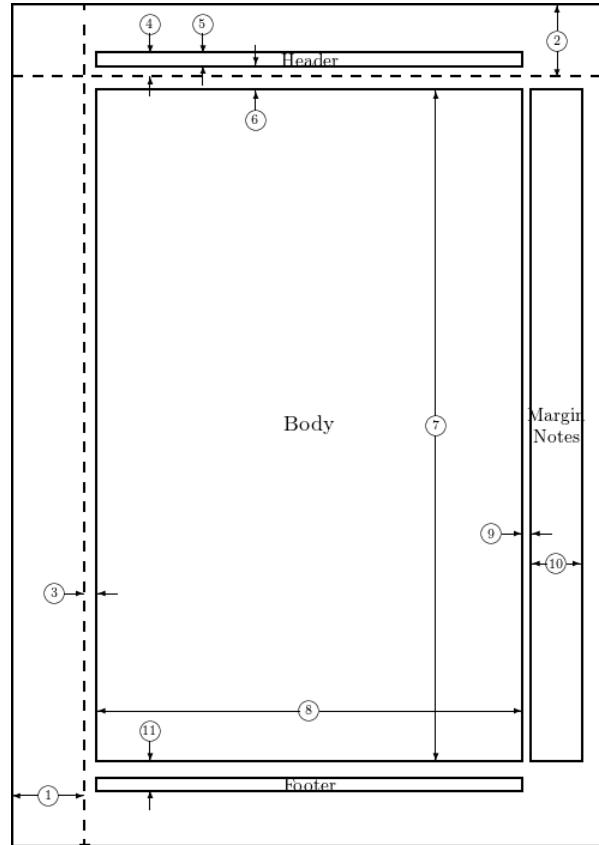
`\smallskip` makes a ~3pt vertical gap

`\medskip` makes a ~6pt vertical gap

`\bigskip` makes a ~12pt vertical gap

# Page geometry

- ▶ Padding
- ▶ Margins
- ▶ Text area
- ▶ Paper size
- ▶ Orientation
- ▶ Footers and Headers



```
1 one inch + \hoffset          2 one inch + \voffset
3 \oddsidemargin = 13pt        4 \topmargin = -23pt
5 \headheight = 12pt           6 \headsep = 25pt
7 \textheight = 674pt          8 \textwidth = 426pt
9 \marginparsep = 10pt         10 \marginparwidth = 50pt
11 \footskip = 30pt            10 \marginparpush = 5pt (not shown)
\hoffset = 0pt                 \voffset = 0pt
\paperwidth = 597pt           \paperheight = 845pt
```

# \usepackage{geometry}

Allows broad tuning of the default page layout:

- \geometry{options} %preamble

papersize and orientation: [a4paper, landscape]

Margin and body size: [margin=2cm, total={10cm, 14cm}]

Headers and footers: [top=5cm, bottom=4cm]

Left and right margin: [left=4cm, right=2cm]

# Page sizes

- ▶ a0paper – a6paper,
- ▶ b0paper – b6paper,
- ▶ c0paper – c6paper,
- ▶ b0j – b6j
- ▶ ansiapaper - ansiepaper,
- ▶ letterpaper, executivepaper, legalpaper

# A series paper

- ▶ ISO standard based on the aspect ratio of a  $1 : \sqrt{2}$
- ▶ Each size down is half the area, and can be made by folding the paper in half
- ▶ Standard usage everywhere except the US and Canada
- ▶ Some central American countries use A paper as standard but commonly also use US paper sizes

# B series paper

- ▶ ISO standard based on the aspect ratio of a  $1 : \sqrt{2}$
- ▶ Sits between A series paper: B0 is exactly between A0 and A1
- ▶ Each size down is half the area, and can be made by folding the paper in half
- ▶ Often used for poster sizes, books, envelopes, passports
- ▶ Can work as a go-between for fitting scaled US and A series paper in one document

# C series paper

- ▶ ISO standard based on the aspect ratio of a  $1 : \sqrt{2}$
- ▶ Averaged size of A and B sizes of the same rank: C0 is halfway between A0 and B0
- ▶ Each size down is half the area, and can be made by folding the paper in half
- ▶ Usually used for envelopes: A4 fits inside a C4, and A4 and C4 fit inside B4.

# Japanese B series variant

- ▶ Japanese alternative to the B series (e.g. b0j)
- ▶ Typically 1.5x larger than the corresponding area of the A paper
- ▶ Each size down is half the area, and can be made by folding the paper in half

# US Sizes

- ▶ Standard in the US, and the de-facto standard in Canada and some Central American countries.
- ▶ Letter paper: length is “ $\frac{1}{4}$  the average maximum stretch of an experienced vatman's arms.” Shorter and fatter than A4.
- ▶ Legal paper: Same width and longer than letter paper
- ▶ Ledger (executive) paper: Smaller and thinner than A4.

Paper	Dimensions (inches)
A4	8.27 x 11.7
Letter	8.5 x 11
Legal	8.5 x 14
Executive	7 x 10

Emperor (1.219m x 1.829m)

Quad Demy

Antiquarian

Grand Eagle

Double Elephant

Atlas

Colombier

Double demy

Imperial

Double large post

Elephant

Princess

Cartridge

Royal

Sheet

Double Post

Super Royal

Broadsheet

Medium

Demy

Copydraught

Large Post

Post

Crown

Pinched Post

Foolscap

Small Foolscap

Brief

Pott

42" x 72" | 121.9cm x  
182.9cm

Name	Folds	Leaves
Folio	1	2
Quarto	2	4
Sexto	3	6
Octavo	3	8
Duodecimo	4	12
Sextodecimo	4	16

12.5" x 15" | 31.8cm x  
38.1cm

# Two sided documents

Sometimes your documents will be printed in a bound or other book format. This means that left and right sides of the page are now different in layout.

Typically, you'll want the margin nearer to the spine to be larger.

Use `\documentclass[twoside]{...}`

Geometry also offers binding settings for two-sided documents for finer tuning, if necessary.

# Headers and Footers

LaTeX has some pre-defined headers and footers for ease of use, with `\pagestyle{option}`:

- ▶ `{headings}` number and section in header, in footer on new chapter pages
- ▶ `{plain}` number in footer
- ▶ `{myheadings}` number in header

Setting the style to only the current page can be achieved with `\thispagestyle{}`. A style can be cleared with `{empty}`

Works with two-paged documents

```
\usepackage{fancyhdr}  
\pagestyle{fancy}  
  
\fancyhf{} % clears the standard header  
\rhead{\thepage}  
\chead{}  
\lhead{}  
\rfoot{...}
```

# Fancyheader – one sided docs

```
\usepackage{fancyhdr}  
\pagestyle{fancy}  
  
\fancyhf{} % clears the standard header  
\fancyhead[LE, RO]{\thepage}  
\fancyhead[CE, CO]{Example header}  
\fancyfoot[RO]{Example footer}...
```

# Fancyheader – two sided docs

```
\Fancyhead[positioning  
]
```

- ▶ Fancyhead and fancyfoot place headers and footers differently on different pages:

	Left	Centre	Right
Even	LE	CE	RE
Odd	LO	CO	RO

# Autogenerated Information

- ▶ \thepage – the page number
- ▶ \thechapter – the chapter number
- ▶ \thesection – the section number
- ▶ \chaptername – “Chapter” or translated equivalent
- ▶ \leftmark – Name and number of the current top level structure (Chapter or Section)
- ▶ \rightmark – Name and number of the current second level structure (Section or SubSection)

# Page numbering

- ▶ Default style is numbered, but can be set with `\pagenumbering{option}` in the preamble
- ▶ Options include:
  - ▶ arabic – arabic numbering (default): 1, 2, 3, 4, 5
  - ▶ roman – lowercase numerals: i, ii, iii, iv, v,
  - ▶ Roman – uppercase numerals: I, II, III, IV, V
  - ▶ alph – lowercase letters: a, b, c, d, e,
  - ▶ Alph – uppercase letters: A, B, C, D, E

# Frontmatter and Mainmatter



In books, the foreword is typically page-numbered in numerals, and the main body is page-numbered in Arabic numbers.



Book documents have an automatic solution to this.



\frontmatter and \mainmatter automatically handle the changing styles for you.



Place \frontmatter at the beginning of the document main body, and \mainmatter where the foreword ends.

# Columns

The multicols package provides the easiest and perhaps prettiest out-of-the box columns.

```
\usepackage{multicols} %preamble  
\begin{multicols}{number of columns}  
[header text here]  
    text...  
\end{multicols}
```

# Column headers

header text goes here, which is completely optional but can sometimes look nice, if it makes sense to have it.

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

This is the second paragraph.

burn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

After this fourth paragraph, we start a new paragraph sequence. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gef-

# Exercise

```
\documentclass[twoside]{book}

\title{Example fancyhdr document}
\author{A\`{u} Th\o r}

\usepackage{blindtext}
\begin{document}
\maketitle
\chapter{foreword}
\section{Acknowledgements}
\Blindtext
\section{Greetings}
\Blindtext
\tableofcontents

\Blinddocument
\end{document}
```

Check the day 2 #08 pdf on GitHub

You'll need to add:

- Columns
- Footers and Headers
- Front and Main Matter

# Exercise

```
\documentclass[twoside]{book}
\title{Example fancyhdr
document}
\author{A\`{u} Th\o r}
\usepackage{fancyhdr}
\pagestyle{fancy}
\fancyhf{}
\fancyhead[CO]{\rightmark}
\fancyhead[CE]{\leftmark}
\fancyfoot[RO, LE]{Page:
\thepage}
\usepackage{multicol}
\usepackage{blindtext}

\begin{document}
\frontmatter
\maketitle
\chapter{foreword}
\section{Acknowledgements}
\Blindtext
\section{Greetings}
\begin{multicols}{2}
[This is the multicol columns
header for the Greetings
section.]
\Blindtext
\end{multicols}
\tableofcontents
\mainmatter
\Blinddocument
\end{document}
```

A large, abstract graphic on the left side of the slide features a dark grey-to-white diagonal gradient. Overlaid on this are several overlapping, semi-transparent green and yellow triangles of varying sizes and orientations, creating a sense of depth and movement.

# ► Bibliographies

How to use bibtex, how to cite and how to autogenerate bibliographies.

# Citations in LaTeX



Two part process: Importing a bibliography and in-body citation.



Requires a backend file that describes your references: a bibtex file



Requires a frontend package for managing your citations and references: biblatex is common, but natbib is more customisable and better for worded citations instead of numeric citations.



You will need to bring your bibtex file into your tex file's folder

```
%preamble  
\usepackage{natbib}  
\bibliographystyle{"style"}  
  
%main body  
\citep{key}  
\bibliography{example} %path to  
bibliography
```

# Bibliography boilerplate

# .bib files

”  
“

Bibtex/biblatex files can be written by hand, but are easiest generated from any reference manager.



Contains highly structured metadata and data on the body of literature referenced



Can contain entire folders of papers, not just the individual ones cited.

# Citation

Multiple ways to cite a paper, but all use the “key” of the citation. Your reference manager may tell you this, or you can search it in the file. This is the unique reference to the paper you’re citing:

- ▶ \citet{key}: textual citation. E.g. “Strange et. al. (2019)”
- ▶ \citep{key}: parenthetical citation: E.g. “(Strange et. al. 2019)”
- ▶ \citeauthor{key}: E.g. “Strange et. al.”
- ▶ \citeyear{key}: E.g. “(2019)”

If you use `\citet*{}` or `\citep*{}` natbib will print all authors instead of *et. al.*

# Citation styles

Your citations are completely customisable.  
In the preamble, set your pattern with:

```
\setcitetstyle{citation mode,  
sep, options}
```

- ▶ Citation mode:  
authoryear | numbers | super
- ▶ Brackets: round | square OR  
open={char}, close={char}
- ▶ Separator: semicolon | comma

# Bibliography style

- ▶ Multiple styles available: full documentation here  
<http://mirrors.ibiblio.org/CTAN/macros/latex/contrib/natbib/natbib.pdf>
- ▶ Bibliography styles can be specified in the preamble with  
`\bibliographystyle{abrvnat}`
- ▶ Common styles include abrvnat, plainnat and unsrtnat

# Example file

```
\documentclass{article}

\usepackage{natbib}
\bibliographystyle{abbrvnat}

\setcitestyle{authoryear, round}

\begin{document}

example textual citation of the
\citet{KaiseruseI0sinhwindow1980} paper. I read this
in a paper \citet{WuGlobalstabilityanalysis2009}

\bibliography{specimen_bibliography}

\end{document}
```

example textual citation of the Kaiser and Schafer (1980) paper. I read this in a paper (Wu, 2009)

## References

- J. Kaiser and R. Schafer. On the use of the I0-sinh window for spectrum analysis. *IEEE Transactions on Acoustics, Speech, and Signal Processing*, 28(1):105–107, Feb. 1980. ISSN 0096-3518. doi: 10.1109/TASSP.1980.1163349.
- H. Wu. Global stability analysis of a general class of discontinuous neural networks with linear growth activation functions. *Information Sciences*, 179(19):3432–3441, Sept. 2009. ISSN 00200255. doi: 10.1016/j.ins.2009.06.006.



Good luck!