Using TEX and LATEX

TEXand LATEX

a) TEX is a system for *typesetting* documents, especially documents that use mathematical notation.

b) Typing mathematics using a word processor is clumsy.

c) Leslie Lamport created LATEX, an add-on to TEX.

d) TEX allows the author to focus more on *content* and less on *appearance*.

e) This document was typeset using LATEX.

"Thinking doesn't guarantee that we won't make mistakes. But not thinking guarantees that we will." — Leslie Lamport

Preamble

(a) The start of a LaTeX file has commands that control the typeface, font, spacing, and more.

(b) This part of a LaTeX file is called the *preamble*.

(c) For the most part, you do not need to fiddle with the preamble–just use the preamble of the problem set.

(d) In the preamble, you can define your own commands.

Text

(a) Following the preamble, the text goes in between

```
\begin{document}
\end{document}
```

(b) Word spacing is handled for you:

Example

Once processed, the text

```
 Every    function that is a derivative has
       the  intermediate value property.
```

typesets as

Every function that is a derivative has the intermediate value property.

(c) To start a new paragraph, leave a blank line.

Problem sets

For a problem set, type your answer following the question, surrounded by a *solution environment*

Example

```
\question [3] Write the statement  \emph{For
every positive real  number \(x\), there is a
positive real  number \(y\) such that \( y < x\) }
in symbolic form.

\begin{solution}
 This is my answer, and I'm sticking to it.
\end{solution}
```

Finish what you start

If you start an environment, such as

```
\begin{solution}
```

be sure to terminate it with

```
\end{solution}
```

If you don't properly end an environment, you'll get errors that might be difficult to understand.

The math environment

Within text, put mathematics between \(and \). For example

Example

```
Define  \( F = x  \in \reals \mapsto x^2 \cos(x)\)
```

Typeset, this is: Define $F = x \in \mathbf{R} \mapsto x^2 \cos(x)$

(a) The command $\reals$ is defined in the preamble of our problem sets. We use it to typeset **R**.

(b) Function names that have two or more characters should be in a non-italic font.

(c) To typeset the cosine function, use the command $\cos$, not cos.

The math environment

To put mathematics on a separate line, use the \[\] environment; for example

Example

```
We have shown that
\[
  E = m c^2 .
 \]
```

Typeset: We have shown that

$$E = mc^2.$$

Alignments

Example

$$
\begin{aligned}
0 < a < 1 &\implies 0 < a^2 < 1, \\
&\implies 0 < 1 - a^2, \\
&\equiv 1 - a^2 > 0.
\end{aligned}
$$

enter

```
\begin{align*}
    0 < a <  1  &\implies 0 < a^2 < 1, \\
                &\implies 0 < 1 - a^2, \\
                &\equiv  1-a^2 > 0.
\end{align*}
```

To start a new line, terminate with a double slash; to align on a symbol, put an ampersand before the symbol.

Mistakes? Me, never

(a) If an environment isn't closed, your file will not process and you will get an error message.

(b) The error message might indicate where the error is located.

(c) If you have trouble finding the location of an error, try placing hunks of text inside a $\backslash\mathrm{begin}\{\mathrm{comment}\}$ environment. LaTeX ignores text in a comment environment.

(d) To use the comment environment, the preamble needs the command $\backslash\mathrm{usepackage}\{\mathrm{comment}\}$.

(e) When the error vanishes, you know it is inside a comment environment.

Help

(a) I sometimes forget how to do something using LaTeX, but

(b) almost surely, the answer can be found with a web search.

(c) **Beware:** A web search that includes the word "latex" might result in some not particularly safe for class items.

Further study

- Overleaf
  https://www.overleaf.com/learn
- Overleaf
  https://www.overleaf.com/learn/latex/Learn_LaTeX_in_30_minutes
- YouTube
  https://www.youtube.com/watch?v=g8Ejj0T0yG4
- YouTube
  https://www.youtube.com/watch?v=P5EWoPOnZTU
- Latex Cheat Sheet
  http://joshua.smcvt.edu/undergradmath/undergradmath_0.png
- Latex Cheat Sheet
  http://joshua.smcvt.edu/undergradmath/undergradmath_1.png
- Symbol Cheat Sheet
  https://oeis.org/wiki/List_of_LaTeX_mathematical_symbols