LaTeXExamples

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1 Text

You type text into LaTeXlike this. It's pretty easy. You can put it anywhere inside the document environment and it'll show up somewhere on the page. You can even make stuff **bold faced**, or `monospaced`.

To start a new paragraph, just leave a blank line. Don't worry about the margins or spacing too much—LaTeXknows how to deal with that better than you do.

Everything should be thought of in terms of sections, environments, and commands. That's all that changes the output. Text looks wrong when it's not inside of something like that—generally speaking.

Quotation marks are a little weird: you use single quotes and back tics instead of regular quotation[1] marks.

In the famous last works of Socrates, "I drank what?"

Everything that starts with a non-escaped backslash in LaTeXis a command. Commands can take arguments: required ones go one each inside { }; optional ones inside [ ]. You can make you own commands if you want, and sometime's it's really helpful.

Fun fact: LaTeXis Turing Complete. Scary, no?

2 Lists

Lists are a great way to keep your ducks in a row!

2.1 Unordered Lists

- First duck

- Second duck

- Third duck

- . . .

2.2 Ordered Lists

You can have normal ordered lists.

1. First duck

2. Second duck

3. Third duck

4. . . .

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[1] Oh, you can have footnotes as well, which are awesome

2.3 Nested Lists

You can nest lists—it doesn't matter that one of the nestings is an unordered list; it's all just text to LaTeX. LaTeXwill also change the way that it enumerates any of the ordered lists in the nesting intellegently.

1. First duck

2. Second duck

3. Third duck

4. ...

5. (a) First duck

    (b) • First duck
         • Second duck
         • Third duck
         • ...
         • i. First duck
           ii. Second duck
          iii. Third duck
          iv.A. First duck
              B. Second duck
              C. Third duck
              D. ...

    (c) Third duck

    (d) ...

2.4 Cutely Ordered Lists

You can also sugguest how LaTeXlabels your lists for you. It will try to guess how to increment whatever you put in the square brackets—which denote optional arguments.

a. First duck

b. Second duck

c. Third duck

d. ...

If you wrap things inside { }, LaTeXtreats them as atomic. The enumerate environment won't try to increment a large atomic thing that it doesn't understand, and you can use this to protect chunks of text. This lets you have some really nice lists if you want. This is typically most helpful for proofs by cases.

Case I: First duck

Case II: Second duck

Case III: Third duck

Case IV: ...

3 Code Blocks

Typesetting code is pretty important. There are packages that try to emulate syntax highlighting with bold type, italic type, etc. They generally fail to be readable at all. A good other option is to use the verbatim environment, which reproduces the text inside of it exactly as it appears and in a typewriter font.

```
public static void main(String [] args){
    System.out.println("Hello, World!");
}
```

If you're doing pseudocode for an algorithm, often the smallcaps font looks very nice to describe the algorithm name. So you might say that BUBBLESORT is an in-place sort while MERGESORT uses a lot of space on the stack for its recursive calls.

The algorithmic package typesets pseudocode pretty well, giving you a small collection of macros to explain most of the common concepts.

if $i \geq maxval$ **then**
    $i \leftarrow 0$
else
    if $i + k \leq maxval$ **then**
        $i \leftarrow i + k$
    end if
end if

4 Mathematics (Hooray!)

You can flip into mathmode whenever you want by putting things inside dollar signs: $\{1, \ldots, 10, \ldots, \omega, \ldots, \omega + \omega, \ldots\}$ or double dollar signs:

$$\sum_{i=0}^{n-1} 2^i = 2^n$$

Things inside single dollar signs get put inline, where as double dollar sign math gets centered and made large. Here's another cool example of that:

$$
\begin{array}{r}
x^2 \quad + x - 6 \\
\hline
x - 1 \overline{)\ x^3 \qquad - 7x + 6} \\
-x^3 + x^2 \\
\hline
x^2 - 7x \\
-x^2 \ + x \\
\hline
-6x + 6 \\
6x - 6 \\
\hline
0
\end{array}
$$

For long chunks of math, you can put things inside the align or align* environments. `align` is just like `align*` except it numbers the lines of math you enter so you can refer to them unambiguously later. You can use the & character to align things in `align` and `align*` equally.

$$
\begin{align}
x &= 1 & \text{define x} \tag{1} \\
y &= Ackermann(x, x) & \text{define y} \tag{2} \\
z &= \sum_i = 0^n 2^i = 2^n & \text{define z} \tag{3}
\end{align}
$$

5 Grids

hello	world	hello	world	hello
hellö	wórld	$\sum_{x=1}^{\infty} x$	world	hello
hello	world	hello	world	hello

6 Labels, References

Labels and references are great. You can use the commands `label` and `ref` to create labels and then refer to them later. This way it doesn't matter if you move your text around, the section numbers will adjust themselves. Examples follow in section **??**

7 Tables, Figures, Floats

Floats are environments—typically `figure` or `table`, but more generally `float`—that wrap diagrams and tables. They can wrap anything that needs a caption and needs to float around in the text to look right. Here are some examples.

hello	world	hello	world	hello
hellö	wórld	$\sum_{x=1}^{\infty} x$	world	hello
hello	world	hello	world	hello

Table 1: The Caption!

Table 2: The Caption!

hello	world	hello	world	hello
hellö	wórld	$\sum_{x=1}^{\infty} x$	world	hello
hello	world	hello	world	hello

if $i \geq maxval$ **then**
   $i \leftarrow 0$
else
  if $i + k \leq maxval$ **then**
    $i \leftarrow i + k$
  end if
end if

Figure 1: Some PseudoCode

You can also have subfloats to have floating elements within floats. A practical example can be found in Figure **??**.

So anyway later in life I can say that I showed you how to cram equations into tabular environments in table **??**. I can also reference all the way back to section **??** without messing up the counters.

1. $T(n) \in O\left(f(n)\right)$ 1. $\exists c > 0 \exists n_0 > 0 \forall n > n_0, T(n) \leq cf(n)$
2. $T(n) \in \Theta\left(f(n)\right)$ 2. $\exists c > 0 \exists n_0 > 0 \forall n > n_0, T(n) \geq cf(n)$
3. $T(n) \in \Omega\left(f(n)\right)$ 3. $\exists c_1 > 0 \exists c_2 > 0 \exists n_0 > 0 \forall n > n_0, c_1 f(n) \leq T(n) \leq c_2 f(n)$

(a) Notation   (b) Definitions

Figure 2: Table from the asymptotics worksheet with subfigures