Introduction to Latex *

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Basic Commands for Latex

How to compile a .tex file

Here are some general commands we need to know:

- `pdflatex file.tex`: to create pdf with latex file into a pdf
- `open file.pdf`: open the pdf file

How to write in Latex?

Writing in Latex is pretty similar to any other document editing software, e.g. Microsoft Word. The slight difference is that it allows you to switch back and forth in math mode, which is convenient if you are writing text files that have more equations, etc. in them.

Some handy commands/ resources

- `\begin{itemize}`,`\end{itemize}`, each item denoted `\item`
- `\section{}`, unnumbered `\section*{}`, `\subsection{}`
- Consider the following vectors with entries in $\mathbb{R}$:
  $\mathbf{x} = (x_1, x_2, \ldots, x_6)$, $\mathbf{u} = (u_1, u_2, \ldots, u_7)$, $\mathbf{a} = (a_1, a_2, \ldots, a_8)$, $\mathbf{w} = (w_1, w_2, \ldots, w_{n+1})$.
- Detextify: **detexify.kirelabs.org/classify.html**
- Sharelatex: https://www.sharelatex.com/
- TeXShop

Defining your own macros

Numbering your theorems, equations, etc.

Theorem 1. *first theorem*

Theorem 2. *second theorem*

*Special thanks to Lesley, Alan, Will

Theorem 3. *third theorem*

Claim 4. *first claim*

Claim 1. *second claim*

$$x_1 + \ldots + x_n = \frac{10^n}{n} \cdot \sqrt{x_n + x_{n+1}} \tag{1}$$

$$\sum_{i=0}^{\infty} a_i x^i \tag{2}$$

The equation 2 is a typical power series.

Expanding on mathematical equations, proof of work

Theorem 2. $\mid V_i(s, u, r_i + 1) - V_i(s, u, r_i) \mid \leq 2b$

Proof. Let's denote s_j and u_j as $s_j = s + jl_{i+1}$ and $u_j = u + jl_{i+1} + r_i$.

$$V_i(s, u, r_i + 1) - V_i(s, u, r_i) = \sum_{j=0}^{j=b-1} \{\mathcal{E}_{i+1}(s_j, u_j + 1) + \mid r_i + 1 \mid - \mathcal{E}_{i+1}(s_j, u_j) - \mid r_i \mid\}$$

By change of variables $r_{i+1,j} + 1 = r'$:

$$\begin{aligned}
\mathcal{E}_{i+1}(s_j, u_j + 1) &= \min(T_{i+1}(s_j, u_j + 1 + r_{i+1,j}) + \mid r_{i+1,j} \mid) \\
&= \min(T_{i+1}(s_j, u_j + r') + \mid r' - 1 \mid) \\
&\leq \min(T_{i+1}(s_j, u_j + r') + \mid r' \mid) + 1 \\
&= \mathcal{E}_{i+1}(s_j, u_j) + 1
\end{aligned}$$

Similarly,

$$\begin{aligned}
\mathcal{E}_{i+1}(s_j, u_j + 1) &= \min(T_{i+1}(s_j, u_j + 1 + r_{i+1,j}) + \mid r_{i+1,j} \mid) \\
&= \min(T_{i+1}(s_j, u_j + r') + \mid r' - 1 \mid) \\
&\geq \min(T_{i+1}(s_j, u_j + r') + \mid r' \mid) - 1 \\
&= \mathcal{E}_{i+1}(s_j, u_j) - 1
\end{aligned}$$

$\therefore$ for every j value, $\mathcal{E}_{i+1}(s_j, u_j) - 1 \leq \mathcal{E}_{i+1}(s_j, u_j + 1) \leq \mathcal{E}_{i+1}(s_j, u_j) + 1$

$$\begin{aligned}
\mid V_i(s, u, r_i + 1) - V_i(s, u, r_i) \mid &= \sum_{j=0}^{j=b-1} \{\mathcal{E}_{i+1}(s_j, u_j + 1) + \mid r_i + 1 \mid - \mathcal{E}_{i+1}(s_j, u_j) - \mid r_i \mid\} \\
&\leq \sum_{j=0}^{j=b-1} \{\mathcal{E}_{i+1}(s_j, u_j + 1) - \mathcal{E}_{i+1}(s_j, u_j)\} + b \\
&\leq b + b \\
&= 2b
\end{aligned}$$

□

Adding Figures, Tables, etc.

Inserting a picture with captions

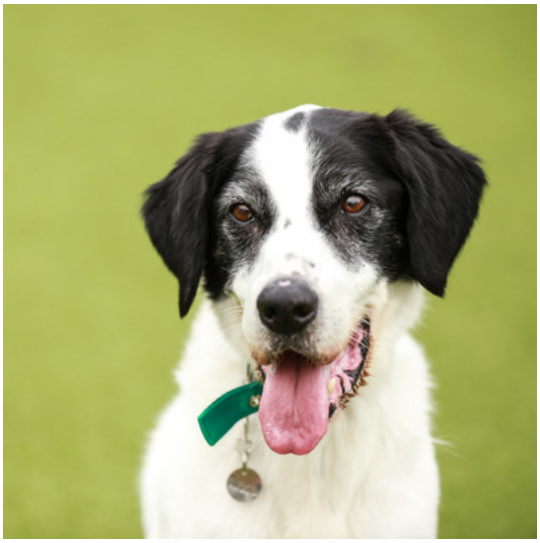

Figure 1: This is a doggo

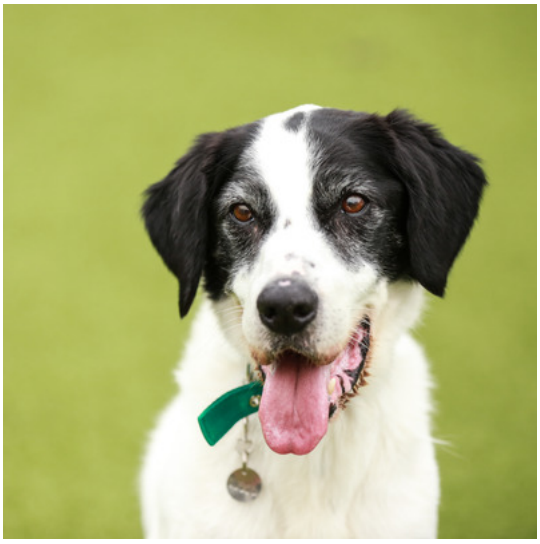

Figure 2: This is a doggo

Inserting a table

cell1	cell2	cell3	cell0
cell4	cell5	cell6	
cell7	cell8	cell9	

How to reference your bibliography

Let's say that we want to cite [5]. We also want to make sure we cite [2] and [4]. Also [1], [3].

References

[1] Albert Einstein. "Zur Elektrodynamik bewegter Körper. (German) [On the electrodynamics of moving bodies]". In: *Annalen der Physik* 322.10 (1905), pp. 891–921. DOI: http://dx.doi.org/10.1002/andp.19053221004.

[2] W. Vickrey. "Counterspeculation, auctions and sealed tenders". In: *Journal of Finance* 16 (1961), pp. 8–37.

[3] Paul Adrien Maurice Dirac. *The Principles of Quantum Mechanics*. International series of monographs on physics. Clarendon Press, 1981. ISBN: 9780198520115.

[4] M. C. Golumbic. *Algorithmic Graph Theory and Perfect Graphs*. 2nd Edition. Elsevier Science, 2004.

[5] Donald Knuth. *Knuth: Computers and Typesetting*. URL: http://www-cs-faculty.stanford.edu/~uno/abcde.html. (accessed: 01.09.2016).

Articles only

[1] Albert Einstein. "Zur Elektrodynamik bewegter Körper. (German) [On the electrodynamics of moving bodies]". In: *Annalen der Physik* 322.10 (1905), pp. 891–921. DOI: http://dx.doi.org/10.1002/andp.19053221004.

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[4] M. C. Golumbic. *Algorithmic Graph Theory and Perfect Graphs*. 2nd Edition. Elsevier Science, 2004.

Physics-related only

[1] Albert Einstein. "Zur Elektrodynamik bewegter Körper. (German) [On the electrodynamics of moving bodies]". In: *Annalen der Physik* 322.10 (1905), pp. 891–921. DOI: http://dx.doi.org/10.1002/andp.19053221004.

[3] Paul Adrien Maurice Dirac. *The Principles of Quantum Mechanics*. International series of monographs on physics. Clarendon Press, 1981. ISBN: 9780198520115.

LaTeX-related only

[5] Donald Knuth. *Knuth: Computers and Typesetting*. URL: `http://www-cs-faculty.stanford.edu/~uno/abcde.html`. (accessed: 01.09.2016).