

How to use Anki with L^AT_EX for revision

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1 Using Anki

For a good introduction how to use Anki I invite you to have a look at *the Hyperbolics* website, where David Edey made a decent introduction on how to use it.

2 Using L^AT_EX in Anki

It is quite simple to start typing in the mathematical formulae in L^AT_EX, writing the whole documents requires more work, but there are plenty of guide books online about that matter, so here you can learn just the stuff that you need to know to do your own Anki cards.

2.1 Using a maths mode

Basically, if you write normal text in L^AT_EX it looks normally, i.e. letters and numbers and punctuations, just when you want to move to the new line you have to type `\\`.

Then, you need the displayed maths and it can be written in two different ways, “in-line” and “displayed”.

In-line maths looks like:

The derivative of a function $f(x) = x^2$ is given by: $\frac{df}{dx} = x$.

whereas displayed maths appears as:

The derivative of a function

$$f(x) = x^2$$

is given by:

$$\frac{df}{dx} = x.$$

There are three distinct ways to generate in-line maths:

- `\(f(x) = x^2\)`
- `$f(x) = x^2$`
- `\begin{math}`

`f(x)= x^2`

`\end{math}`

There are two ways to generate displayed maths:

- `\[f(x) = x^2\]`
- `\begin{displaymath}`

`f(x)= x^2`

`\end{displaymath}`

I prefer using the brackets form, i.e.

`\(...\)`

and

`\[...\]`

2.2 Special characters in maths mode

So in maths mode you can use numbers and letters normally (note that letters are in *italics*), but the spaces do not appear on the screen. In order to make a space you have to write: `_` (i.e. a *backslash* and a *space*). What's more you can write a lot of different special symbols, some of them are listed below:

Table 1: Letters of the Greek alphabet

| | | | | | | | |
|-----------------------|------------|--------------------------|---------------|-----------------------|------------|-----------------------|------------|
| <code>\alpha</code> | α | <code>\beta</code> | β | <code>\gamma</code> | γ | <code>\delta</code> | δ |
| <code>\epsilon</code> | ϵ | <code>\varepsilon</code> | ε | <code>\zeta</code> | ζ | <code>\eta</code> | η |
| <code>\theta</code> | θ | <code>\iota</code> | ι | <code>\kappa</code> | κ | <code>\lambda</code> | λ |
| <code>\mu</code> | μ | <code>\nu</code> | ν | <code>\xi</code> | ξ | <code>\omicron</code> | \omicron |
| <code>\pi</code> | π | <code>\varpi</code> | ϖ | <code>\rho</code> | ρ | <code>\varrho</code> | ϱ |
| <code>\sigma</code> | σ | <code>\varsigma</code> | ς | <code>\tau</code> | τ | <code>\upsilon</code> | υ |
| <code>\phi</code> | ϕ | <code>\varphi</code> | φ | <code>\chi</code> | χ | <code>\psi</code> | ψ |
| <code>\omega</code> | ω | | | | | | |
| <code>A</code> | A | <code>B</code> | B | <code>\Gamma</code> | Γ | <code>\Delta</code> | Δ |
| <code>E</code> | E | <code>Z</code> | Z | <code>\Theta</code> | Θ | <code>H</code> | H |
| <code>I</code> | I | <code>K</code> | K | <code>\Lambda</code> | Λ | <code>M</code> | M |
| <code>N</code> | N | <code>\Xi</code> | Ξ | <code>O</code> | O | <code>\Pi</code> | Π |
| <code>P</code> | P | <code>\Sigma</code> | Σ | <code>\Upsilon</code> | Υ | <code>\Phi</code> | Φ |
| <code>X</code> | X | <code>\Psi</code> | Ψ | <code>\Omega</code> | Ω | | |

Table 2: The set of maths accents

| | | | | | |
|------------------------|-------------|------------------------|-------------|----------------------|-----------|
| <code>\hat{o}</code> | \hat{o} | <code>\tilde{o}</code> | \tilde{o} | <code>\bar{o}</code> | \bar{o} |
| <code>\dot{o}</code> | \dot{o} | <code>\ddot{o}</code> | \ddot{o} | <code>\vec{o}</code> | \vec{o} |
| <code>\acute{o}</code> | \acute{o} | <code>\grave{o}</code> | \grave{o} | | |
| <code>\check{o}</code> | \check{o} | <code>\breve{o}</code> | \breve{o} | | |

Table 3: Binary operations

| | | | | | | | |
|------------------------|-------------|-----------------------|------------|-----------------------|------------|-------------------------------|--------------------|
| <code>+</code> | $+$ | <code>\oplus</code> | \oplus | <code>\cap</code> | \cap | <code>\triangleleft</code> | \triangleleft |
| <code>-</code> | $-$ | <code>\ominus</code> | \ominus | <code>\cup</code> | \cup | <code>\triangleright</code> | \triangleright |
| <code>\pm</code> | \pm | <code>\bullet</code> | \bullet | <code>\vee</code> | \vee | <code>\bigtriangleup</code> | \bigtriangleup |
| <code>\mp</code> | \mp | <code>\circ</code> | \circ | <code>\wedge</code> | \wedge | <code>\bigtriangledown</code> | \bigtriangledown |
| <code>\setminus</code> | \setminus | <code>\bigcirc</code> | \bigcirc | <code>\sqcup</code> | \sqcup | <code>\lhd</code> | \lhd |
| <code>\times</code> | \times | <code>\otimes</code> | \otimes | <code>\sqcap</code> | \sqcap | <code>\unlhd</code> | \unlhd |
| <code>\cdot</code> | \cdot | <code>\odot</code> | \odot | <code>\uplus</code> | \uplus | <code>\rhd</code> | \rhd |
| <code>/</code> | $/$ | <code>\oslash</code> | \oslash | <code>\amalg</code> | \amalg | <code>\unrhd</code> | \unrhd |
| <code>\div</code> | \div | <code>\ast</code> | \ast | <code>\star</code> | \star | <code>\diamond</code> | \diamond |
| <code>\wr</code> | \wr | <code>\dagger</code> | \dagger | <code>\ddagger</code> | \ddagger | | |

Table 4: Binary relations

| | | | | | | | |
|----------------------|----------------|----------------------|----------------|------------------------|-------------|--------------------------|---------------|
| $>$ | \succ | <code>\succ</code> | \succ | <code>\supset</code> | \supset | <code>\sqsupset</code> | \sqsupset |
| <code>\geq</code> | \succcurlyeq | <code>\succeq</code> | \succcurlyeq | <code>\supseteq</code> | \supseteq | <code>\sqsupseteq</code> | \sqsupseteq |
| <code>\in</code> | \in | <code>\vdash</code> | \vdash | <code>\smile</code> | \smile | | |
| $<$ | \prec | <code>\prec</code> | \prec | <code>\subset</code> | \subset | <code>\sqsubset</code> | \sqsubset |
| <code>\leq</code> | \preceq | <code>\preceq</code> | \preceq | <code>\subseteq</code> | \subseteq | <code>\sqsubseteq</code> | \sqsubseteq |
| <code>\ni</code> | \ni | <code>\dashv</code> | \dashv | <code>\frown</code> | \frown | | |
| <code>\sim</code> | \sim | <code>\approx</code> | \approx | <code>\neq</code> | \neq | <code>\mid</code> | \mid |
| <code>\simeq</code> | \simeq | <code>\cong</code> | \cong | <code>\doteq</code> | \doteq | <code>\parallel</code> | \parallel |
| <code>\equiv</code> | \equiv | <code>\asymp</code> | \asymp | <code>\Join</code> | \Join | <code>\bowtie</code> | \bowtie |
| <code>\models</code> | \models | <code>\perp</code> | \perp | <code>\propto</code> | \propto | $=$ | $=$ |

Table 5: Arrows

| | | | |
|----------------------------------|-----------------------|----------------------------------|-----------------------|
| <code>\leftarrow</code> | \leftarrow | <code>\rightarrow</code> | \rightarrow |
| <code>\Leftarrow</code> | \Leftarrow | <code>\Rightarrow</code> | \Rightarrow |
| <code>\longleftarrow</code> | \longleftarrow | <code>\longrightarrow</code> | \longrightarrow |
| <code>\Longleftarrow</code> | \Longleftarrow | <code>\Longrightarrow</code> | \Longrightarrow |
| <code>\hookrightarrow</code> | \hookrightarrow | <code>\hookleftarrow</code> | \hookleftarrow |
| <code>\leftharpoonup</code> | \leftharpoonup | <code>\rightharpoonup</code> | \rightharpoonup |
| <code>\leftharpoondown</code> | \leftharpoondown | <code>\rightharpoondown</code> | \rightharpoondown |
| <code>\leftrightarrow</code> | \leftrightarrow | <code>\Leftrightarrow</code> | \Leftrightarrow |
| <code>\longleftrightarrow</code> | \longleftrightarrow | <code>\Longleftrightarrow</code> | \Longleftrightarrow |
| <code>\mapsto</code> | \mapsto | <code>\longmapsto</code> | \longmapsto |
| <code>\rightleftharpoons</code> | \rightleftharpoons | <code>\leadsto</code> | \leadsto |
| <code>\uparrow</code> | \uparrow | <code>\downarrow</code> | \downarrow |
| <code>\Uparrow</code> | \Uparrow | <code>\Downarrow</code> | \Downarrow |
| <code>\updownarrow</code> | \updownarrow | <code>\Updownarrow</code> | \Updownarrow |
| <code>\nearrow</code> | \nearrow | <code>\searrow</code> | \searrow |
| <code>\nwarrow</code> | \nwarrow | <code>\swarrow</code> | \swarrow |

Table 6: Mathematical miscellany

| | | | | | |
|-------------------------|--------------|---------------------------|----------------|-------------------------|--------------|
| <code>\aleph</code> | \aleph | <code>\forall</code> | \forall | <code>\exists</code> | \exists |
| <code>\ell</code> | ℓ | <code>\imath</code> | \imath | <code>\jmath</code> | \jmath |
| <code>\prime</code> | \prime | <code>\emptyset</code> | \emptyset | <code>\hbar</code> | \hbar |
| <code>\Bos</code> | \square | <code>\triangle</code> | \triangle | <code>\Diamond</code> | \diamond |
| <code>\clubsuit</code> | \clubsuit | <code>\spadesuit</code> | \spadesuit | <code>\infty</code> | ∞ |
| <code>\heartsuit</code> | \heartsuit | <code>\diamondsuit</code> | \diamondsuit | <code>\partial</code> | ∂ |
| <code>\nabla</code> | ∇ | <code>\neg</code> | \neg | <code>\surd</code> | \surd |
| <code>\flat</code> | \flat | <code>\natural</code> | \natural | <code>\sharp</code> | \sharp |
| <code>\l</code> | \parallel | <code>\top</code> | \top | <code>\bot</code> | \perp |
| <code>\wp</code> | \wp | <code>\Re</code> | \Re | <code>\Im</code> | \Im |
| <code>\mho</code> | \mho | <code>\angle</code> | \angle | <code>\backslash</code> | \backslash |

Table 7: Super- and subscripts

| | | | |
|---------------|--------------|---------------|--------------|
| A^B | A^B | A_B | A_B |
| A^{BC} | A^{BC} | A_{BC} | A_{BC} |
| $A^{\{BC\}}$ | A^{BC} | $A_{\{BC\}}$ | A_{BC} |
| $A^{\{B^C\}}$ | A^{B^C} | $A_{\{B_C\}}$ | A_{B_C} |
| $\{A^B\}^C$ | A^{BC} | $\{A_B\}_C$ | A_{BC} |
| $A^B{}^C$ | <i>error</i> | $A_B{}_C$ | <i>error</i> |
| $A^B{}_C$ | A_C^B | $A^B{}_C$ | A_B^C |
| $A^{\{B_C\}}$ | A^{B_C} | $A_{\{B^C\}}$ | A_{B^C} |
| $\{A^B\}_C$ | $A^B{}_C$ | $\{A_B\}^C$ | A_B^C |

Table 8: Delimiters

| | | | |
|---------|---|------------|---|
| (| (|) |) |
| [| [|] |] |
| \{ | { | \} | } |
| | | \ | |
| \lfloor | ⌊ | \rfloor | ⌋ |
| \lceil | ⌈ | \rceil | ⌉ |
| \langle | ⟨ | \rangle | ⟩ |
| / | / | \backslash | \ |

Table 9: The resizing symbols

| | | | | | |
|-----------|---|------------|---|-----------|---|
| \sum | ∑ | \prod | ∏ | \coprod | ∐ |
| \bigcup | ⋃ | \bigcap | ⋂ | \biguplus | ⊕ |
| \bigvee | ⋓ | \bigwedge | ⋀ | \int | ∫ |
| \bigoplus | ⊕ | \bigotimes | ⊗ | \bigodot | ⊙ |
| \bigsqcup | ⊔ | | | \oint | ∮ |

They are called *resizing symbols* as their size depends on whether they are used in displayed maths or in-line maths mode (they are bigger in former and smaller in latter). Also the location of s

2.3 Other common constructions

Some important constructions shown using examples:

2.3.1 Surds

`\(2 = \sqrt{4} = \sqrt[3]{8} \)`

$$2 = \sqrt{4} = \sqrt[3]{8}$$

2.3.2 Fractions

`\(\frac{x^2+4}{x+2i} \)`

$$\frac{x^2+4}{x+2i}$$

2.3.3 Ellipsis

`\(1,2,\ldots,n; 1+2+\cdots+n \)`

$1, 2, \dots, n; 1 + 2 + \dots + n$ You can also use vertical and diagonal dots using commands `\vdots` and `\ddots` respectively.

2.3.4 Arrays (matrices)

```
\(
\left(
\begin{array}{cccc}
1 & & & \\
& 0 & & \\
& & \cdots & \\
& & & 0 & \\
0 & & & & \ddots & \\
& & & & & \vdots & \\
\vdots & & \ddots & & \ddots & & 0 & \\
0 & & \cdots & & 0 & & & 1 & \\
\end{array}
\right)
\)
```

$$\begin{pmatrix} 1 & 0 & \cdots & 0 \\ 0 & 1 & \ddots & \vdots \\ \vdots & \ddots & \ddots & 0 \\ 0 & \cdots & 0 & 1 \end{pmatrix}$$

Note that:

- `\begin{array}{cccc}` starts the array consisting of 4 columns centre aligned. If you want to have a different alignment in some/all columns, then instead of using `c`, use `l` or `r` for left or right alignment respectively.
- Note that `&` is used to move to another entry within a line and `\\` command is used to indicate the end of the line.
- `\end{array}` ends the array.
- `\left(... \right)` creates the parentheses of a right size. If we used just `(` and `)` instead, the parentheses would be too small. Note that all delimiters listed in Table 8 can be used with `\left` and `\right`. E.g. `\left{ ... \right}`

2.4 Fonts

The default font in maths mode is *italics* but we can change it using appropriate commands. The most useful ones are listed in the table below:

Table 10: Different fonts

| | |
|--|--|
| <code>R,C,N,Z,a^2+b^2=c^2</code> | <i>R, C, N, Z, a² + b² = c²</i> |
| <code>\mathrm{R,C,N,Z,a^2+b^2=c^2}</code> | R, C, N, Z, a² + b² = c² |
| <code>\mathbb{R,C,N,Z,a^2+b^2=c^2}</code> | $\mathbb{R}, \mathbb{C}, \mathbb{N}, \mathbb{Z}, \mathcal{D}^{\neq} + \neq = \neq$ |
| <code>\mathsf{R,C,N,Z,a^2+b^2=c^2}</code> | R, C, N, Z, a² + b² = c² |
| <code>\mathtt{R,C,N,Z,a^2+b^2=c^2}</code> | R, C, N, Z, a² + b² = c² |
| <code>\mathit{R,C,N,Z,a^2+b^2=c^2}</code> | <i>R, C, N, Z, a² + b² = c²</i> |
| <code>\mathbf{R,C,N,Z,a^2+b^2=c^2}</code> | R, C, N, Z, a² + b² = c² |
| <code>\mathcal{R,C,N,Z,a^2+b^2=c^2}</code> | <i>R, C, N, Z, a² + b² = c²</i> |

Note that `\mathbb` is useful for denoting the sets of real/complex numbers, integers, etc. it is well defined for capital letters only but using this font is unpredictable with other symbols. Similarly with the font `\mathcal` which is a caligraphic font.

2.5 Equation arrays

If we have a set of equations that we want to align nicely we can use the command `\begin{eqnarray*}` ... `\end{eqnarray*}`:

```
\begin{eqnarray*}
x & = & & y+2-1 \\
& & & \\
& & & y+1 \\
& & & \\
& & & y \\
\end{eqnarray*}
```

Note that this is treated as a three column array with `{rcl}` alignment.

2.6 Function names

When we want to type a function “sin”, then if we just type `sin` in maths mode it would be displayed as sin , which looks like a product of some numbers s, i, n , so to make the function distinguishable we can \LaTeX has a set of defined functions, that are displayed in roman types. The sine function in \LaTeX can be obtained by typing in `\sin`, which is displayed as $\sin(x)$ instead of $sin(x)$.

Table 11: The set of maths functions names in \LaTeX

| | | | | |
|----------------------|----------------------|----------------------|----------------------|----------------------|
| <code>\arccos</code> | <code>\arcsin</code> | <code>\arctan</code> | <code>\arg</code> | <code>\cos</code> |
| <code>\cosh</code> | <code>\coth</code> | <code>\csc</code> | <code>\deg</code> | <code>\det</code> |
| <code>\dim</code> | <code>\exp</code> | <code>\gcd</code> | <code>\hom</code> | <code>\inf</code> |
| <code>\ker</code> | <code>\lg</code> | <code>\lim</code> | <code>\liminf</code> | <code>\limsup</code> |
| <code>\ln</code> | <code>\log</code> | <code>\max</code> | <code>\min</code> | <code>\Pr</code> |
| <code>\sec</code> | <code>\sin</code> | <code>\sinh</code> | <code>\sup</code> | <code>\tan</code> |
| <code>\tanh</code> | | | | |

3 References

You can find plenty of manuals on how to use \LaTeX online, which will help you with writing the whole documents in \LaTeX .

This manual was based and all tables are from “An Introduction to \LaTeX ” by Kate M Jeary, from the University of Cambridge Computing Service, I advice you to take part in one of the classes organised by the Computing Service, as you can learn much more there.