

Style guide for typesetting MAT9390

lecture note

Makoto

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1 Notation / convention

- Display math environments are `\[...]`, not `$$...$$`
- Sequence of same type: $A_1, A_2, \dots$; index is starting 1, avoid A', A''
- Graph: Γ , with vertex set V_Γ , edge set E_Γ
- Hilbert space: H (input as `H`), vectors $v, w, \dots$
- Inner product: depending on the context and preference, use either $\langle v|w \rangle$ or v^*w ; input as `\langle v | w \rangle` or `v^* w`. Both are linear in w and antilinear in v . Avoid using the `physics` package (it destroys spacing), but the `braket` package is fine. If the overall formula is long, use the v^*w style.
- Linear operator: $T: H_1 \rightarrow H_2$; input as `T \colon H_1 \to H_2`
- Applying a linear operator to a vector: if the formula is simple, write like Tv_1 without parentheses.
- Algebra of linear operators on H : $\mathcal{B}(H)$; input as `\mathcal{B}(H)`
- Adjoint of linear operator: T^*
- Linear operator inside the inner product: $\langle v|T|w \rangle$ or v^*Tw
- Rank 1 operator: $|v\rangle\langle w|$ or vw^*
- Set: $\{x \in X : \forall y \in Y \ xy = yx\}$; input `\{ x \in X : \forall y \in Y \, , \ x y = y x \}`
- Linear span: $\text{span}\langle x_k : k = 1, \dots, n \rangle$; input `\operatorname{span}\langle x_{\{k\}} : k = \dots`
- Finite dimensional C^* -algebra: B , whose elements are $a, b, \dots$, with norm $\|a\|$ and adjoint a^* ; input as `\left\| a \right\|` and `a^*`

- Postive functionals $\psi: B \rightarrow \mathbb{C}$ need not be normalized as states

2 Text

The body text can be informal, but we still want more or less grammatically correct English sentences.

- As a general rule, formulas should be treated as objects. In particular, avoid incorporating parts of the formula as verbs. For example, “Since $A = 0$, we have ...” should be transformed to “Since we have $A = 0$, we have ...” or something else.
- I use a lot of squiggly arrow symbol $\rightsquigarrow$ which should be expanded into something like “Then we get”, etc.
- I often write settings behind definitions and propositions like “ V : finite set, $E \subset V \times V$ ”. These should be properly expanded as “Let V be a finite set, and $E \subset V \times V$ be a subset”, etc.
- Sentences like ‘Generally: (some formula)’ or ‘Classically: (some formula)’ should be expanded as ‘Genarally, we have (some formula; it can be in a display math environment $\backslash[\dots\backslash]$)’, etc.
- Lists can have grammatically incomplete items like ‘Positive: $\psi(a^*a) \geq 0$ ’, but the over all list should be enclosed in a proper sentence like ‘We consider the following conditions about ψ : LIST’, etc.

Other stylistic guidelines:

- Expand all abbreviations, like “s.t.”, “pos.”, “mat.”.
- Underlined words should be converted to italics; use `\emph{emphasized words}`

3 Diagrams

Simple formulas involving diagrams: in the text body, convert the diagrams to the usual tensor calculus form, then present a placeholder of the diagram separately in **figure** environment. (You don’t have to draw the diagram there, but try to put a sensible caption.) For example, the proposition on page 2 of the January 19 lecture should read:

Proposition. *We have $m(X \otimes Y)m^* = Z$ with $Z_{vw} = |V_\Gamma| X_{vw}Y_{vw}$.*

PLACEHOLDER

Figure 1: Convolution product of X and Y

Proof. Do a direct computation with above formulas for m^* , X_{vw} , and m . □

Computation involving diagram manipulation: write start and end of manipulation as usual mathematical formula, then present a placeholder of the diagrams separately in the **figure** environment. For example, the proof of proposition on page 2 of the February 2 lecture should read something like:

We have

$$m(A_1 \otimes A_2)m^*\Lambda(c) = (\Lambda(a_1)^* \otimes \Lambda(a_2)^*)m^*\Lambda(c)m(\Lambda(b_1) \otimes \Lambda(b_2)) = \dots,$$

see Figure 2.

PLACEHOLDER

Figure 2: Convolution of A_1 and A_2 on $\Lambda(c)$