On the Structure and Aims of the Lecture Notes

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This note sets out my thoughts on the structure of the lecture notes *Complex Analytic Geometry and Dynamics on Analytic Neighborhood Spaces* and the aims behind writing them.

> **To Students Taking the Course for Credit**
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> This text explains the structure of the lecture notes and the aims behind writing them. **It is not intended as a statement permitting, prohibiting, or recommending students' use of generative AI in preparing or submitting their reports.** When preparing and submitting reports, please follow the policies of the University of Tokyo and your department or other relevant unit, as well as the instructions given for the assignments and their submission in this course.
>
> University guidance: Notice to students / Information on generative AI

01 A Record of the Author's Understanding and a Guide to Related Literature

One purpose in writing these notes was to re-examine my own understanding of the concepts and results that I had learned and used. I wanted to return to definitions and assumptions, clarify the relationships between different theories and the basis for the arguments, and leave a record of my understanding at the time of writing that could later be consulted.

I also felt a need for a guide to the literature that would help readers see where to learn the fundamentals needed to approach specialized works and research papers in related fields. I consider J.-P. Demailly's lecture notes and online texts, such as *Complex Analytic and Differential Geometry*, excellent resources in this respect. At the same time, although much depends on a reader's progress in their studies, my impression is that these texts require a fair amount of background knowledge for readers such as undergraduates and students in the early stages of their master's studies. I also wished to put together a guide to textbooks and other references in which readers can learn elementary concepts, as preparation for studying such works.

In Chapters I and II in particular, I aimed to cover these basic matters and provide pointers to the literature as broadly as my knowledge allowed, with readers at the undergraduate or early master's level also in mind. These chapters are not necessarily intended to be read straight through from the beginning; they are reference material to consult as needed when reading the later discussions or related literature.

I would like readers to be able to work back from a point that raises a question to its underlying premises, and to check the definitions and grounds on which my arguments rely. I also want any misconceptions or errors in my own understanding to be identifiable.

02 Anticipating Changes in How Mathematical Literature Is Read

While working on these notes in 2025 and 2026, I felt that the circumstances surrounding the use of generative AI in mathematics were changing substantially. I expected mathematical literature to be read increasingly with the aid of generative AI and large language models (LLMs), and kept this possibility in mind when considering how to present the material.

(Here I am describing a possibility I envisaged at the time of writing, rather than expressing an opinion on whether this way of reading is desirable.)

My concern was that **even when an explanation appears to flow naturally, differences in definitions or assumptions, and the grounds for an argument, can become difficult to discern**.

> **An example of making definitional conventions explicit**
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> For example, whether the definition of a topological vector space includes the Hausdorff property varies from one source to another. In these notes, a general topological vector space is not assumed to be Hausdorff, and later sections also discuss non-Hausdorff cohomology. Where conventions differ among researchers, fields, or contexts in this way, I wanted to state explicitly which definitions and conventions these notes follow.

With proofs, too, I aim to state as explicitly as possible which definitions and assumptions I start from and how the argument leads to the conclusion. Even when I do not include a complete proof in the text, I would like to indicate its strategy and the results it uses, and to identify, as precisely as possible, sources and passages that readers can consult to follow the proof in detail.

What I am describing here is **one approach to exposition and organization that I am trying in these notes in response to one concern**. I am not claiming to have demonstrated that this approach is effective or superior, nor do I intend to offer a general standard or the only correct way to use generative AI in mathematics. It is also not intended as a general recommendation that other works in mathematics or in other fields should be written or read in the same way.

03 Distinguishing My Understanding at the Time of Writing from Later Additions

I aim for mathematical accuracy in these notes. As the author, I make the final judgments about their mathematical content and exposition and bear responsibility for them. My use of ChatGPT in writing the notes is described in the preface.

At the same time, I also consider it important that **my own misconceptions or gaps in my arguments should not become obscured by later additions**. For example, if I mistakenly thought that a step followed easily, but in fact it required an essentially different argument, then even if further arguments supplied by readers or AI justify the conclusion, that does not mean that my original understanding or argument was correct.

My intention is to distinguish what was established in the original text from what was supplied later, and not to treat those substantive additions as contributions I had already made at the time of writing. When an error is discovered, I would like to revise the text to give a correct argument while also making clear what was wrong and what reasoning was needed to correct it.

Lecture Notes Discussed Here

T. Koike, *Complex Analytic Geometry and Dynamics on Analytic Neighborhood Spaces*,
https://tkoike.com/lecture/komaba2026/