Winding Number of a Curve - LEAN4 Project (Logbook)

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Abstract

In this logbook we aim to show how the journey with this project has been since day 0. The content is divided in weeks, so we explain what we have been doing weekly, decisions made and main difficulties we have had to tackle.

1 Choosing our project topic

There were various options that seemed good for us, from Carmichael numbers to orientability of manifolds. Lastly, we decided to work in a complex analysis topic: the winding number.

The winding number of a curve can be defined in several ways, although we only focused on the topological and analytic ones. Our main goal was going to be to prove the equivalence between these definitions, albeit we quickly noticed it was going to be a very stretch goal due to its complexity and the time we had.

Since this project focuses on the definition and properties of the winding number, we will now give the definition of *curve* that we have used - there is no a general consensus on how to define them, especially regarding the definition interval.

For us, a curve γ will be a $\mathcal{C}^\infty(\mathcal{I}, \mathbb{C})$ function, where I stands for the unit interval.

- **Topological definition:** it uses the path-lifting property [ref]. Given a curve γ
- **Analytic definitions:** seguir

2 Main difficulties

Here is the main content of the article.

2.1 Subsection Example

This is a subsection.

3 Conclusion and possible future work

This is the conclusion of the article.

References

[1] Author Name, *Book Title*, Publisher, Year.

[2] Another Author, *Another Book*, Another Publisher, Year.