Numbers, Sequences and Series

Lecture Notes, T1 2023/24

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Welcome

These are the Lecture Notes of **Numbers, Sequences & Series 400297** for T1 2023 at the University of Hull. I will follow these lecture notes during the course. If you have any question or find any typo, please email me at

S.Fanzon@hull.ac.uk

Up to date information about the course and homework will be published on the **`course webpage`**

silviofanzon.com/blog/2023/NSS

Homework will also be released on the Hull **`Canvas webpage`**

canvas.hull.ac.uk/courses/67551

References

We will study the set of real numbers $\mathbb{R}$, and then sequences and series in $\mathbb{R}$. I will follow mainly the textbook by Bartle and Sherbert [2]. Other references that inspired these notes are the books by Abbott [1] and Rudin [3].

> **!** You are not expected to purchase any of the above books. These lecture notes will cover 100% of the topics you are expected to known in order to excel in the final exam.

1 Numbers

1.1 Introduction

The aim of this section is to rigorously introduce the set of real numbers $\mathbb{R}$. But what do we mean by real number anyways? To start our discussion, introduce the set of natural numbers (or non-negative integers)

$$\mathbb{N} = \{0, 1, 2, 3, 4, 5, ... \}$$

On this set we have a notion of **sum** of two numbers, denoted as usual by

$$n + m$$

for $n, m \in \mathbb{N}$. Here the symbol $\in$ denotes that m and n belong to $\mathbb{N}$. For example $3 + 7$ results in 10.

Question

Can the sum be inverted?sadl

2 Sequences

3 Series

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References

[1] S. Abbott. *Understanding Analysis*. Second Edition. Springer, 2015.

[2] R. G. Bartle and D. R. Sherbert. *Introduction to Real Analysis*. Fourth Edition. Wiley, 2011.

[3] W. Rudin. *Principles of Mathematical Analysis*. Third Edition. McGraw Hill, 1976.