Math 311
Spring 2018
Dr. Hussein Awala

Day #2 Notes: More Preliminaries

January 22, 2018

Contents

1 The rationals

What are the properties of the rational numbers?

How can we construct $\mathbb{Q}$?

2 Preliminaries

2.1 Set Operations

Intersection and Union:

Complement:

Infinite Operations:

Example 1 *$A_n = \{k \in \mathbb{N} : k \geq n\}$. Describe A_n and compute $\cup_{n=1}^{\infty} A_n$ and $\cap_{n=1}^{\infty} A_n$.*

3 Functions

What is a function?

Example 2 *Define* $g : [0, 1] \to \mathbb{R}$ *by*

$$g(x) = \begin{cases} 1 & x \in \mathbb{Q} \\ 0 & x \notin \mathbb{Q} \end{cases}.$$

This is known as Dirichlet's function. *What does it look like?*

4 Conclusions

Today we learned about:

1. More about rational numbers
2. Sets and set operations
3. Functions

Wednesday we will learn about:

1. Induction, and Axiom of Completeness.

Upcoming Deadlines:

- January 31, 2017 : Homework 1

Questions?