MATH-270-45
Week 1 Book of Proofs

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Contents

Chapter 1

1.1 Sets

Definition 1.1.1: Introduction to sets

N —Natural Numbers— = {1,2,3,...} is the set of natural numbers.
Z —Integers— = {...,-3,-2,-1,0,1,2,3,...}
Q —Rational Numbers— = {..., -2, -1, 0, 1, 2, ...}
R —Real Numbers— = {...,$\frac{1}{2}$,$\frac{-3}{4}$,0,...}
C —Complex Numbers— = All number of the form a + bi, where a and be are real numbers and i is imaginary
P —Prime Numbers— = Natural numbers greater than 1 that are divisable only by 1 and themselves
F —Finite Fields— = A set of elements with oepration of +, -, * and / (except by 0)

Definition 1.1.2: The Cartesian Product

An ordered par (a, b) is a set
{{a},{a,b}}
You've seen ordered pairs before as graphs coordinates
(1,2) = {{1},{1,2}}
(1,2) = {{2},{2,1}}
(-2,0)

Definition 1.1.3: Subsets

Definition 1.1.4: Power Sets

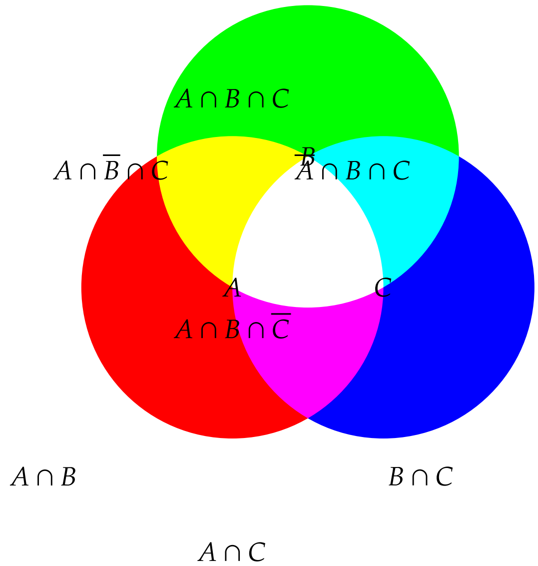

Figure 1.1: A Venn diagram for the sets A, B, and C.

Definition 1.1.5: Union, Intersection, Difference

The **Union** of two sets contain all the elements contain in either set (or both sets).
The union is notated $\mathbb{A} \cup \mathbb{B}$
More formally, $x \epsilon \mathbb{A} \cup \mathbb{B}$ if $x \epsilon \mathbb{A}$ or $x \epsilon \mathbb{B}$ (or both)
The **intersection** of two sets contains only the elements that ar in both sets.
The interseection is notated $\mathbb{A} \cap \mathbb{B}$
More formally, $x \epsilon \mathbb{A} \cap \mathbb{B}$ x if $\epsilon \mathbb{A}$ and $x \epsilon \mathbb{B}$
The **complement** of a set A contains everything that is not in the set A.
The complement is notated A, or A^c, or sometimes A.
A
$A \cup B = \{x\!: x \epsilon A$ **OR** $x \epsilon B\}$
$A \cap B = \{x\!: x \epsilon A$ **AND** $x \epsilon B\}$
$A^e = \{x\!:\!x \not\epsilon A\}$
A-$B = \{x\!:\!x \epsilon A$ **AND** $x \not\epsilon B\}$