

The Book of Math (Notes)

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Forward and Disclaimer

These are math notes made by a student (with a physics major and math minor) based off text books. It may contain misconceptions and misinterpretations, thus should not be viewed in the same light of a text book. Use at your own risk and mental sanity.

Symbols

Logic

Name	Symbol	Comment
Exists	\exists	There exists at least one
For all	\forall	
Not exists	\nexists	There does not exist
Exists one	$\exists!$	There only exists one and only one
And	\wedge	
Or	\vee	Inclusive or
Not	\neg	
Logically implies	\implies	If
Logically implied by	\impliedby	Only if
Logically equivalent	\iff	If and only if
Implies	\longrightarrow	
Implied by	\longleftarrow	
Equivalent?	\longleftrightarrow	

Set Notation

Name	Symbol	Comment
Empty Set	\emptyset	The set that is empty
Natural Numbers	\mathbb{N}	Set of natural numbers not containing 0, equivalent to the set of positive integers
Integers	\mathbb{Z}	Set of integers
Rational Numbers	\mathbb{Q}	
Real Numbers	\mathbb{R}	
Complex Numbers	\mathbb{C}	
In	\in	
Not in	\notin	
Owns	\ni	Has an element
Proper Subset	\subset	Subset that is not itself
Subset	\subseteq	
Superset	\supset	Superset that is not itself
Proper Superset	\supsetneq	
Power set	\wp	
Union	\cup	
Intersection	\cap	

Difference	\setminus
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Relationships

Name	Symbol	Comment
Defined	\doteq	
Approximate	\approx	
Equivalent	\equiv	Isomorphic (Group Theory)
Congruent	\cong	Homomorphic (Group Theory)
Proportional	\propto	

Operators

Name	Symbol	Comment
	\oplus	
	\otimes	
	\odot	
	\circ	Convolution
Dagger	\dagger	Complex conjugate transpose of a matrix

Arrows

Name	Symbol	Comment
Maps to	\mapsto	

Hebrew

Name	Symbol	Comment
Aleph	\aleph	Carnality of infinite sets that can be well ordered

Other

Name	Symbol	Comment
Real part	\Re	Real part of a number
Imaginary part	\Im	Imaginary part of a number

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Part I

Logic

Part II

Real Analysis

Books Used:

1. Kenneth A. Ross - Elementary Analysis (2nd Ed.) [1]

Part III

Complex Analysis

Books Used:

1. Brown and Churchill - Complex Variables and Applications [2]

Chapter 1

Conformal Mapping

Part IV

Differential Equations

Part V

Partial Differential Equations

Part VI

Linear Algebra

Chapter 2

Markov Chains

Part VII

Tensors

Part VIII

Riemann Geometry

Part IX

Group Theory

Part X

Galois Theory

Part XI

Set Theory

Part XII

Model Theory

Part XIII

Tips and Tricks

Part XIV

Bibliography

Bibliography

- [1] Kenneth A. Ross. *Elementary Analysis*. Springer, 2 edition, 2013.
- [2] James Ward Brown and Ruel V. Churchill. *Complex Variables and Applications*. McGraw-Hill Education, 9 edition, 2014.