



Curriculum

Number Theory I

This is the first course in elementary number theory:

- **NT.I.1** Primes, Divisibility
 - **NT.I.2** Arithmetic of Remainders
 - **NT.I.3** Bezout's Theorem and Euclidean Algorithm
 - **NT.I.4** Theory of congruence
 - **NT.I.5** Number Theoretic Functions
 - **NT.I.6** Theorems of Fermat, Euler, and Wilson
 - **NT.I.7** Pythagorean Triples
 - **NT.I.8** Chinese Remainder Theorem
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Combinatorics I

This is the first course in combinatorics and elementary counting techniques:

- **Com.I.1** Multiplication and Addition rules
 - **Com.I.2** Bijection Principles
 - **Com.I.3** Combinatorial Coefficients
 - **Com.I.4** Inclusion and Exclusion Principles
 - **Com.I.5** Pigeon Hole Principle
 - **Com.I.6** Recursions
 - **Com.I.7** Shortest Route Problems
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Algebra I

This is a first course in school algebra. (We assume that the student is familiar with algebraic expressions, and elementary algebraic identities)

- **Alg.I.1** Algebraic identities (Sophie Germain, Cube of three etc.)
 - **Alg.I.2** Mathematical Induction
 - **Alg.I.3** Binomial Theorem
 - **Alg.I.4** Linear Equations
 - **Alg.I.5** Quadratic Equation
 - **Alg.I.6** Remainder Theorem
 - **Alg.I.7** Theorems related to roots of an integer polynomial
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Geometry I

- **Geo.I.1** Locus visualization
 - **Geo.I.2** Straight Lines
 - **Geo.I.3** Triangles
 - **Geo.I.4** Geometric Constructions
 - **Geo.I.5** Circles
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Trigonometry I

- **Trig.I.1** Angle and rotation
- **Trig.I.2** Half arcs and Half chords - Genesis of trigonometric ratios
- **Trig.I.3** Elementary ratios and associated angles
- **Trig.I.4** Trigonometric identities
- **Trig.I.5** Geometry and trigonometry
- **Trig.I.6** Basic properties of Triangles



- **Trig.I.7** Compound Angles
 - **Trig.I.8** Multiple and Submultiple Angles
 - **Trig.I.9** Trigonometric Series
 - **Trig.I.10** Height and Distance
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Inequality I

This first course in inequality must be preceded by a basic course in algebra.

- **Ineq.I.1** Geometric Inequalities
 - **Ineq.I.2** Arithmetic and Geometric Mean Inequality
 - **Ineq.I.3** Cauchy Schwarz Inequality
 - **Ineq.I.4** Titu's Lemma
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Complex Number I

- **Complex.I.1** Geometry of Screw Similarity
 - **Complex.I.2** Field Properties of complex Number
 - **Complex.I.3** n th roots of unity and Primitive roots
 - **Complex.I.4** Basic applications to geometry
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Calculus I

- **Calc.I.1** Sequences and Series
- **Calc.I.2** Limit
- **Calc.I.3** Functions
- **Calc.I.4** Continuity
- **Calc.I.5** Differential Calculus
- **Calc.I.6** Cauchy's Theorem and Mean value



- **Calc.I.7** Graphing Techniques
 - **Calc.I.8** Integral Calculus
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Coordinate Geometry I

- **CG.I.1** Straight Lines
 - **CG.I.2** Circles
 - **CG.I.3** Parabola
 - **CG.I.4** Ellipse
 - **CG.I.5** Hyperbola
 - **CG.I.6** Polar loci
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