Essential Maths for Competitive Programming C++

Week 1

- **Day 1:** Analysis of Algorithm: Best, Average and Worst Case, Notation, Time and Space Complexity.
- **Day 2,3,4:** Basics- AP, GP, IO manipulation, Tricks for CP, Floating Point Fixed and Scientific and other formats, few questions. Try attempting all the questions given. 16,17
- **Day 5, 6:** Fibonacci- Fibonacci Numbers, properties, Divisibility and GCD and few questions. Try attempting all the questions given.
- **Day 7:** Bit Masking- Bitwise operators, Count set bits, check set bits, one/two odd occurring element, and few other questions. Try attempting all the questions given.

Week 2

- **Day 1,2:** Continuation of Week 1 Day 7.
- **Day 3,4,5:** Prime numbers, Sieve of Eratosthenes, Segmented Sieve, Try attempting all the questions given.
- **Day 6,7:** Prime Factors and Factorization for multiple queries. Try attempting all the questions given.

Week 3

- **Day 1,2,3:** Divisors and Factors- All divisors, numbers with exactly 3 divisors, count factors and divisors, and few questions. Try attempting all the questions given.
- **Day 4,5,6,:** GCD, LCM, Euclidean Algorithm and Extended Euclidean Algorithm, Bezout's Identity, Linear Diophantine Equation. Try attempting all the questions given.
- **Day 7:** Euler Totient Function and its properties, Euler Totient for 1 to N. Try attempting all the questions given.

Week 4

- **Day 1, 2:** Continuation of Week 3 Day 7.
- **Day 3,4,5:** Mathematical Principles- Inclusion Exclusion Principle, Pigeonhole Principle, Derangements, and few questions. Try attempting all the questions given.
- **Day 6,7:** Modular Arithmetic- Modular Arithmetic in CP, ranges of int Type, Modular Properties, Modular Inverse using Euler's Theorem, Fermet's Little theorem, Chinese Remainder Theorem and few questions. Try attempting all the questions given.

Week 5

- **Day 1,2:** Continuation of Week 4 Day 7.
- **Day 3,4,5:** Computing Power, Matrix Exponentiation, its recursive solution. Try attempting all the questions given.
- **Day 6,7:** Permutation and Combination, nCr and nCr mod p for Large Prime. Try attempting all the questions given.

Week 6

- **Day 1,2:** Continuation of Week 5 Day 7.
- **Day 3,4,5,6:** Catalan Number and implementation, Counting Polygon Triangulation, and few questions. Try attempting all the questions given.
- **Day 7:** Combinational Game Theory, Mex and Grundy Number, Composite games, Sprague Grundy Theorem, game of Nim. Try attempting all the questions given.

Week 7

- **Day 1,2,3,4:** Continuation of Week 6 Day 7.
- **Day 5,6,7:** Geometric algorithm- Orientation of 3 ordered points, Line segment Intersection, Convex Hull Problem, Jarvi March algorithm and related questions, Grahm Scan algorithm and related questions, Sweep Line Algorithm. Try attempting all the questions given.

Week 8

- **Day 1,2:** Continuation of Week 7 Day 7.
- **Day 3 onwards:** Try out all the miscellaneous questions and revise previous topics.

Note 1: This is a recommended plan to complete the course, but it is the complete discretion of the candidates to choose their way of completion of the course depending on the availability and efficiency of the course.

Note 2: Also, while solving tracks it is advisable to complete the Problem set simultaneously.