Introduction to Competitive programming

Why?

- Because its fun
- Helps learn programming deeply
- Asked in most of the interviews
- Platform to prove yourself

What we will cover?

1. Introduction to why algorithms are important and why they are important part of being a Computer Programmer
2. Big-O, Big-theta, Big-Ohmega Notations
3. Problem format
    - Problem statement
    - Input
    - Output
    - Estimating if a problem will run on our coding style
    - Estimated complexity we require to build solution
4. Simple Questions i.e. very easy from hackerearth, cakewalk or beginner from codechef and div2 A from codeforces
5. Algorithm paradigms
    - Brute force
    - Divide and Conquer
    - Greedy
    - Dynamic Programming
6. Data Structures and their algorithms
    - Arrays
    - Strings
        - Basic String Searching
        - Knuth Morris Pratt Algorithm
        - Z-Algorithm*
        - Manachar's Algorithm*
    - Trees
        - Traversal (DFS and BFS)
        - Binary Seach Tree
        - AVL and Red-Black tree
        - Heaps
            - Priority Queue
            - Heap Sort
            - Construction time of a heap
    - Graphs
        - Construction using adjacency list
        - Traversal DFS

        - Disjoint Set Unions
        - Minimum Spanning Trees using Kruskal and Prims Algorithm
        - Minimum Distance Algorithms using Floyd-Warshall, Bellman-Ford and Dijkstra
        - Maximum Flow Algorithms*
        - Topological Sort*
        - Will See if more needs to be done
    - Hashing
        - What is hashing.
        - Unneccessary theory but kinda important
    - Segment Tree
        - Basic
        - Lazy propogation*
        - Persistant*
        - Fenwick Binary Tree
    - Stack
        - A simple introduction
        - Few important stack questions
    - Queue
        - Will be done before BFS traversal
    - Trie

7. Mathematics
    - Euclid's GCD
    - Prime Numbers
    - Sieve of Eratosthene
    - Golbach Conjecture
    - Will add on as I remember
8. Standard Template Library for C++ coders
    - Vectors
    - Set
    - Multiset
    - Maps
    - Unordered Maps
    - Queue
    - Priority Queue
    - Stack
    - Deque
    - Important STL Functions
9. Important Algorithms that needs to be covered as well
    - Sorting
        - Quick Sort
        - Counting Sort
        - Radix Sort
    - Binary Search
    - Linear Search
    - Kardane's Algorithm

* If class has reached level to study that topic.