Name: Which year are you in:

Have you done CE/CZ2001:

Have you taken part in any programming contest(s):

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Topics you know | | yes | | | no |
| **Data structures and libraries** | Basic data types, big integers, basic data structures (including maps and sets), | 1 | | |  |
| union-find structure, | 1 | | |  |
| augmenting binary search trees, | 1 | | |  |
| segment tree, | 1 | | |  |
| Fenwick or binary indexed tree, | 1 | | |  |
| C++ and java libraries | 1 | | |  |
| **Problem solving paradigms** | Complete search, | 1 | |  | |
| divide and conquer, | 1 | |  | |
| greedy algorithms, | 1 | |  | |
| dynamic programming: 1-dimensional DP, 2-dimentional DP, interval DP, tree DP, subset DP | 1 | |  | |
| **Combinatorial games** | Simple games, | 1 | |  | |
| decision tree, |  | |  | |
| Minimax algorithm, |  | |  | |
| Nim game, Grundy numbers (Nimbers) | 1 | |  | |
| **Graphs** | Directed acyclic graphs, bipartite graphs, Bridges, connected components, strongly connected components, | 1 | |  | |
| topological sort, | 1 | |  | |
| Kruskal’s algorithm, minimum spanning tree | 1 | |  | |
| Floyd-Warshall algorithm, all pairs shortest paths | 1 | |  | |
| Bellman-Ford Algorithm, single source, edge may be -ve | 1 | |  | |
| **Network flow** | Ford Fulkerson’s Method, Edmonds Karp’s algorithm, | 1 | |  | |
| min-cost max-flow algorithm | 1 | |  | |
| applications (e.g. bipartitie matching, airline scheduling, project selection). | 1 | |  | |
| **Mathematics** | Basics: sum of powers, fast exponentiation, logarithm; Number theory: modular arithmetic, gcd and lcm, Chinese remainder theorem, primality testing, prime sieves | 1 | | |  |
| **String processing** | Knuth Morris Pratt algorithm, |  |  | | |
| string matching with DP, |  |  | | |
| suffix trie/tree/array |  |  | | |
| **Computational geometry** | Points, vectors, line segments, dot product, cross product (area of a triangle, counter-clockwise, whether two line segment intersect), polygons, | 1 |  | | |
| convex hull, point in convex polygon, | 1 |  | | |
| point in concave polygon, |  |  | | |
| closest pair of points |  |  | | |