**Math**

|  |  |  |
| --- | --- | --- |
| **#** | **Title** | **Difficulty** |
| 1 | Matrix Exponentiation | 1 |
| 2 | FFT | 2 |
| 3 | NTT | 2 |
| 4 | Online NTT | 3 |
| 5 | FWHT | 2 |
| 6 | Lagrange Interpolation | 2 |
| 7 | Lagrange Interpolation with Polynomial Extraction | 3 |
| 8 | Polynomial Sum | 3 |
| 9 | Polynomial with Binomial Coefficients | 3 |
| 10 | Subset Sum Problem | 3 |
| 11 | Generating Functions | 3 |
| 12 | Polynomial Structure | 3 |
| 13 | Polynomial Factorization of (x^n - 1) | 3 |
| 14 | Berlekamp Messey | 3 |
| 15 | Reeds–Sloane Algorithm | 3 |
| 16 | Linear Recurrence using Cayley-Hamilton theorem | 2 |
| 17 | Linear Recurrence using Generating Functions | 3 |
| 18 | Linear Recurrence with Polynomial Coefficients | 3 |
| 19 | Linear Recurrence on Matrices | 3 |
| 20 | Generating Function of a Linear Recurrence | 2 |
| 21 | Gaussian Elimination | 2 |
| 22 | Gaussian Elimination under Modulo | 2 |
| 23 | Gaussian Elimination Modulo 2 | 2 |
| 24 | Determinant under Prime Modulo | 2 |
| 25 | Determinant under Composite Modulo | 2 |
| 26 | Determinant of Product Matrix | 3 |
| 27 | Determinant of Sparse Matrix | 3 |
| 28 | Determinant of Permutant Matrix | 3 |
| 29 | Determinant of Cyclic Matrix | 3 |
| 30 | Cauchy–Binet formula | 3 |
| 31 | Thomas Algorithm | 2 |
| 32 | Inverse of a Matrix | 3 |
| 33 | Inverse of a Matrix modulo 2 | 3 |
| 34 | Basis Vector | 2 |
| 35 | Basis Vector Reduced Row Echelon Form. | 2 |
| 36 | Basis Vector ft Weighted Linearly Independent Vectors. | 2 |
| 37 | Permanent of a Matrix | 2 |
| 38 | All Possible Perfect Matching XOR Values | 2 |
| 39 | Hafnian of a Matrix | 3 |
| 40 | Vandermonde Matrix | 3 |
| 41 | Freivalds Algorithm | 3 |
| 42 | Characteristic Polynomial Faster / Hesserberg Matrix | 3 |
| 43 | Faulhaber's Formula Fastest | 3 |
| 44 | Lagrange Multiplier | 3 |
| 45 | Titu's Lemma | 2 |
| 46 | Simplex Algorithm | 3 |
| 47 | Integration | 2 |
| 48 | Line Integral | 2 |
| 49 | The Slime Trick | 3 |
| 50 | Gauss's Eureka Theorem | 2 |
| 51 | LTE Lemma | 2 |
| 52 | Expected Value | 1 |
| 53 | Expected Value Powers Technique | 2 |
| 54 | Finite Field Arithmetic Binary | 2 |
| 55 | Max Convolution between Convex Funtions | 2 |

**Number Theory**

|  |  |  |
| --- | --- | --- |
| **#** | **Title** | **Difficulty** |
| 56 | Binary Exponentiation | 1 |
| 57 | Modular Inverse | 1 |
| 58 | Sieve | 1 |
| 59 | Sieve upto 1e9 | 3 |
| 60 | Extended Euclid | 1 |
| 61 | Combinatorics Basics | 1 |
| 62 | Lucas Theorem | 1 |
| 63 | nCr Modulo Any Mod | 2 |
| 64 | Prefix Sum Queries of nCi | 2 |
| 65 | Sum of nCi over a Fixed Congruence Class | 2 |
| 66 | "Sum of nCr(a(i) k) for each k from 1 to n" | 2 |
| 67 | Sum of nCi for a Fixed Large n | 3 |
| 68 | Phi Function | 1 |
| 69 | Power Tower | 2 |
| 70 | Mobius Function | 1 |
| 71 | CRT | 1 |
| 72 | Linear Congruence Equation | 1 |
| 73 | Pollard Rho | 2 |
| 74 | Primitive Root | 2 |
| 75 | Multiplicative Order / Carmichael's Lambda Function | 2 |
| 76 | Discrete Log | 2 |
| 77 | Discrete Root | 2 |
| 78 | Discrete Root in O(p^(1/4)) using Tonelli-Shanks Algorithm | 3 |
| 79 | Number of Distinct Kth Powers Modulo n | 3 |
| 80 | Number of Solutions to x^2 = 1 mod m | 2 |
| 81 | Tonelli Shanks Algorithm | 3 |
| 82 | Pells Equation | 3 |
| 83 | Linear Diophantine Equation with Two Variables | 1 |
| 84 | Trivariable Linear Diophantine Equation with Nonnegative Solutions | 3 |
| 85 | Multivariable Linear Diophantine Equation with Nonnegative Solutions | 3 |
| 86 | Linear Diophantine With N Unknowns and Two Equations | 3 |
| 87 | Floor Sum of Arithmetic Progression | 2 |
| 88 | Generalized Floor Sum of Arithmetic Progression | 3 |
| 89 | Sum of Floors | 1 |
| 90 | Number of Nonnegative Integer Solutions to ax+by ≤ c | 3 |
| 91 | Number of ax % p in a Range | 3 |
| 92 | Smallest Nonnegative Integer x s.t. l ≤ ax % p ≤ r | 3 |
| 93 | Prime Counting Function | 2 |
| 94 | K Divisors | 3 |
| 95 | Smallest Number Having Exactly K Divisors | 2 |
| 96 | Sum of The Number of Divisors in cbrt(n) | 3 |
| 97 | Linear Sieve for Multiplicative Functions | 1 |
| 98 | Min\_25 Sieve | 3 |
| 99 | Mobius Inversion | 2 |
| 100 | Dirichlet convolution | 2 |
| 101 | Number of Solutions to a Basic Linear Algebraic Equation | 1 |
| 102 | Number of Solutions to a Basic Linear Algebraic Equation with Variable Upper Bound Constraints | 3 |
| 103 | Partition Function | 3 |
| 104 | Stirling Number of the First Kind for Fixed n | 2 |
| 105 | Stirling Number of the First Kind for Fixed k | 3 |
| 106 | Stirling Number of the Second Kind for Fixed n | 2 |
| 107 | Stirling Number of the Second Kind for Fixed k | 3 |
| 108 | Bell Number | 2 |
| 109 | LCM of Fibonacci Numbers | 2 |
| 110 | Phi Field | 2 |
| 111 | Pisano Period | 3 |
| 112 | Rational Approximation / Stern-Brocot Tree | 3 |
| 113 | Factoradic Number System | 2 |
| 114 | Intersection of Arithmetic Progressions | 1 |
| 115 | Continued Fractions | 2 |
| 116 | Maximum Coprime Product | 2 |

**Graph Theory**

|  |  |  |
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| **#** | **Title** | **Difficulty** |
| 117 | DFS and BFS | 1 |
| 118 | 0/1 BFS | 1 |
| 119 | Dial's algorithm | 2 |
| 120 | Inverse Graph | 1 |
| 121 | LCA | 1 |
| 122 | LCA in O(1) | 2 |
| 123 | SCC | 1 |
| 124 | Incremental SCC | 3 |
| 125 | DFS Tree | 1 |
| 126 | Rerooting Technique | 1 |
| 127 | Articulation Bridges and Bridge Tree | 1 |
| 128 | Online Articulation Bridges | 3 |
| 129 | Strong Orientation | 1 |
| 130 | Articulation Points. | 1 |
| 131 | Block Cut Tree | 2 |
| 132 | Three Edge Connectivity | 3 |
| 133 | Four Edge Connectivity | 3 |
| 134 | Dynamic K-Connectivity | 3 |
| 135 | Prim's MST | 1 |
| 136 | Krushkal's MST | 1 |
| 137 | Steiner Tree Problem | 2 |
| 138 | Boruvka's Algorithm | 2 |
| 139 | Minimum Diameter Spanning Tree | 3 |
| 140 | Manhattan MST | 3 |
| 141 | Euclidean MST | 3 |
| 142 | Directed MST | 3 |
| 143 | Dynamic MST | 3 |
| 144 | Dijkstra's Algorithm | 1 |
| 145 | Dijkstra on Segment Tree | 2 |
| 146 | Bellman Ford | 1 |
| 147 | Floyd Warshall | 1 |
| 148 | Johnsons Alogrithm | 2 |
| 149 | SPFA | 1 |
| 150 | Cycle Detection | 1 |
| 151 | Minimum Weight Cycle For Each Vertex | 2 |
| 152 | Minimum Weight Cycle For Each Edge | 2 |
| 153 | Dominator tree | 2 |
| 154 | 2 SAT | 1 |
| 155 | 3 SAT | 3 |
| 156 | Maximum Clique | 1 |
| 157 | Number of Different Cliques | 2 |
| 158 | Maximum Independent Set | 1 |
| 159 | Eulerian Path on a Directed Graph | 1 |
| 160 | Eulerian Path on an Undirected Graph | 1 |
| 161 | Path Union | 2 |
| 162 | Path Intersection | 2 |
| 163 | Virtual Tree | 2 |
| 164 | Welsh-Powell Algorithm | 2 |
| 165 | Chromatic Number | 1 |
| 166 | Chromatic Polynoimial ft Number of DAGs | 3 |
| 167 | Dynamic DAG Reachability | 3 |
| 168 | Minimum Mean Weight Cycle | 3 |
| 169 | Number of 3 and 4 length Cycles | 3 |
| 170 | Counting Labeled Graphs | 1 |
| 171 | Chordal Graph | 2 |
| 172 | Cactus Graph | 2 |
| 173 | Edge Coloring of Simple Graph | 3 |
| 174 | Edge Coloring of Bipartite Graph | 3 |
| 175 | Dynamic Diameter Online | 3 |
| 176 | Tree Orientation to Maximize Pairs of Reachable Nodes | 3 |
| 177 | Number of Arborescences with n Nodes | 2 |
| 178 | Kirchoffs Theorem ft Number of MSTs | 2 |
| 179 | Tuttes Theorem ft Arborescences in a Graph | 2 |
| 180 | BEST Theorem | 2 |
| 181 | System Of Difference Constraints | 2 |
| 182 | Prufer Code | 1 |
| 183 | Number of Ways to Make a Graph Connected | 1 |
| 184 | Tree Isomorphism | 1 |
| 185 | Number of Paths of Each Length in a Tree | 2 |
| 186 | Ear Decomposition | 2 |
| 187 | Eppsteins Algorithm | 3 |
| 188 | Hamiltonian Path Heuristic Algorithm | 3 |
| 189 | Erdos Gallai Theorem | 2 |
| 190 | Havel Hakimi Algorithm | 2 |
| 191 | Dinics Algorithm | 1 |
| 192 | Push Relabel Algorithm | 2 |
| 193 | Min Cost Max Flow | 2 |
| 194 | Min Cost Max Flow with Negative Cycles | 3 |
| 195 | Maximum Closure Problem | 2 |
| 196 | Min Cut in a Planar Graph | 2 |
| 197 | Max Cut in a Planar Graph | 3 |
| 198 | Unique Min Cut | 2 |
| 199 | L-R Flow | 2 |
| 200 | Gomory-Hu Tree | 3 |
| 201 | Gomory Hu Tree of a Planar Graph | 3 |
| 202 | Stoer Wagner Algorithm | 3 |
| 203 | HopCroft Karp Algorithm | 1 |
| 204 | Kuhns Algorithm | 1 |
| 205 | Hungarian Algorithm | 1 |
| 206 | Blossom Algorithm | 2 |
| 207 | Blossom Algorithm Weighted | 3 |
| 208 | Chinese Postman Problem | 1 |
| 209 | ST-numbering | 3 |
| 210 | POSET ft Dilworths and Mirskys Theorem | 2 |
| 211 | Stable Marriage Problem | 2 |
| 212 | Halls Theorem | 1 |
| 213 | Maximum Density Subgraph | 3 |
| 214 | Randomized Matching | 2 |
| 215 | Number of Perfect Matchings in a Graph | 3 |
| 216 | Planarity Check | 3 |

**Data Structures**

|  |  |  |
| --- | --- | --- |
| **Title** | **Resources** | **Difficulty** |
| 217 | Segment Tree | 1 |
| 218 | Segment Tree with Lazy Propagation | 1 |
| 219 | Persistent Segment Tree | 1 |
| 220 | Persistent Segment Tree with Lazy Propagation | 2 |
| 221 | Dynamic Segment Tree | 1 |
| 222 | 2D Dynamic Segment Tree | 2 |
| 223 | Iterative Segment Tree | 1 |
| 224 | Segment Tree ft Arithmetic Progressions | 1 |
| 225 | Segment Tree Merging | 2 |
| 226 | Segment Tree Beats | 3 |
| 227 | Merge Sort Tree | 1 |
| 228 | Wavelet Tree | 1 |
| 229 | Sparse Table | 1 |
| 230 | Disjoint Sparse Table | 2 |
| 231 | Sparse Table 2D | 2 |
| 232 | BIT | 1 |
| 233 | Lower bound on BIT | 1 |
| 234 | BIT with Range Update and Range Query | 2 |
| 235 | 2D BIT with Range Update and Range Query | 2 |
| 236 | MOs Algorithm | 1 |
| 237 | MOs on Tree | 2 |
| 238 | MOs with Update | 2 |
| 239 | MOs Online | 2 |
| 240 | MOs with DSU | 2 |
| 241 | Sweepline MO | 3 |
| 242 | Trie | 1 |
| 243 | Persistent Trie | 2 |
| 244 | DSU | 1 |
| 245 | Reachability Tree/ DSU Tree | 2 |
| 246 | DSU with Rollbacks | 1 |
| 247 | Partially Persistent DSU | 3 |
| 248 | Persistent DSU | 3 |
| 249 | Augmented DSU | 2 |
| 250 | Queue Undo Trick | 3 |
| 251 | Dynamic Connectivity Problem | 2 |
| 252 | DSU on Tree | 1 |
| 253 | SQRT Decomposition | 1 |
| 254 | SQRT Decomposition Split and Build Technique | 3 |
| 255 | Centroid Decomposition | 1 |
| 256 | Persistent Centroid Decomposition | 3 |
| 257 | Binarizing a Tree | 1 |
| 258 | HLD ft Subtrees and Path Query | 2 |
| 259 | HLD ft Persistent Lazy Propagation | 3 |
| 260 | LCT | 2 |
| 261 | Treap | 2 |
| 262 | Implicit Treap | 2 |
| 263 | Persistent Treap | 3 |
| 264 | SQRT Tree | 3 |
| 265 | KD Tree | 2 |
| 266 | Cartesian Tree | 2 |
| 267 | Rope | 1 |
| 268 | Monotonous Queue | 1 |
| 269 | BST using STL | 1 |
| 270 | Persistent BST | 3 |
| 271 | Ordered Set | 1 |
| 272 | Static to Dynamic Trick | 2 |
| 273 | Interval Set | 2 |
| 274 | Divide and Conquer on Queries | 2 |
| 275 | Divide and Conquer for Insert and Query Problems | 2 |
| 276 | Venice Technique | 1 |
| 277 | Permutation Tree | 3 |
| 278 | Persistent Array | 1 |
| 279 | Persistent Queue | 3 |
| 280 | Persistent Meldable Heap | 2 |
| 281 | Top Tree | 3 |
| 282 | PQ Tree | 3 |
| 283 | Link Cut Cactus | 3 |
| 284 | HDLT | 3 |

**Strings**

|  |  |  |
| --- | --- | --- |
| **#** | **Title** | **Difficulty** |
| 285 | KMP | 1 |
| 286 | Prefix Automaton | 1 |
| 287 | Z algorithm | 1 |
| 288 | Aho Corasick | 1 |
| 289 | Dynamic Aho Corasick | 2 |
| 290 | Aho Corasick ft All Pair Occurrence Relation | 2 |
| 291 | String Matching using Bitsets | 1 |
| 292 | String Matching with FFT | 2 |
| 293 | String Hashing | 1 |
| 294 | 2D String Hashing | 2 |
| 295 | Suffix Array | 2 |
| 296 | Isomorphic Suffix Array | 3 |
| 297 | Suffix Automaton | 2 |
| 298 | Suffix Automaton ft Distinct Substring Queries in Range. | 3 |
| 299 | Suffix Tree | 3 |
| 300 | Palindromic Tree | 2 |
| 301 | Persistent Palindromic Tree | 3 |
| 302 | Manachers Algorithm | 2 |
| 303 | Minimum Palindrome Factorization | 3 |
| 304 | Number of Palindromes in Range | 2 |
| 305 | Lyndon Factorization | 2 |
| 306 | Main-Lorentz Algorithm | 3 |
| 307 | All Substring Longest Common Subsequence | 3 |
| 308 | Bit LCS | 3 |
| 309 | Cyclic LCS | 3 |
| 310 | De Bruijn Sequence | 1 |
| 311 | LCS on RLE compressed string | 3 |

**DP**

|  |  |  |
| --- | --- | --- |
| **#** | **Title** | **Difficulty** |
| 312 | Digit DP | 1 |
| 313 | CHT | 2 |
| 314 | Dynamic CHT | 2 |
| 315 | Persistent CHT | 3 |
| 316 | Li Chao Tree | 2 |
| 317 | Persistent Li Chao Tree | 2 |
| 318 | Extended Li Chao tree | 3 |
| 319 | Divide and Conquer Optimization | 1 |
| 320 | Knuth Optimization | 1 |
| 321 | Substring DP | 1 |
| 322 | Bounded Knapsack | 1 |
| 323 | SOS DP | 1 |
| 324 | Subset Sum Convolution | 2 |
| 325 | Dynamic Submask Count | 2 |
| 326 | DP over Divisors | 1 |
| 327 | Subset Sum in SQRT | 1 |
| 328 | LIS Range Query | 2 |
| 329 | Aliens Trick | 2 |
| 330 | 1D1D DP Optimization | 3 |
| 331 | Connected Component DP | 3 |
| 332 | Slope Trick | 2 |
| 333 | Subset Union of Bitsets | 2 |
| 334 | Number of Subsequences Having Product at least K | 2 |
| 335 | Hirschbergs Algorithm | 3 |
| 336 | Broken Profile DP/plug dp | 2 |
| 337 | XOR Equation | 2 |
| 338 | "x2 +1 trick" | 1 |
| 339 | Open and Close Interval Trick | 1 |
| 340 | Bitmask DP | 1 |

**Geometry**

|  |  |  |
| --- | --- | --- |
| **#** | **Title** | **Difficulty** |
| 341 | Geometry 2D Everything | 3 |
| 342 | Basic Point Structure(2D) | 1 |
| 343 | Polar Sort(2D) | 1 |
| 344 | Basic Line Structure(2D) | 1 |
| 345 | Angle Bisector(2D) | 1 |
| 346 | Dist from Point to Line(2D) | 1 |
| 347 | Dist from Point to Ray(2D) | 1 |
| 348 | Dist from Point to Segment(2D) | 1 |
| 349 | Dist from Segment to Segment(2D) | 1 |
| 350 | Check if Point is on Segment(2D) | 1 |
| 351 | Line Line Intersection(2D) | 1 |
| 352 | Point Line Relation(2D) | 1 |
| 353 | Project from Point to Line(2D) | 1 |
| 354 | Project from Point to Segment(2D) | 1 |
| 355 | Ray Ray Distance(2D) | 1 |
| 356 | Ray Ray Intersection(2D) | 1 |
| 357 | Reflection from Point to Line(2D) | 1 |
| 358 | Segment Line Intersection(2D) | 1 |
| 359 | Segment Line Relation(2D) | 1 |
| 360 | Segment Segment Intersection(2D) | 1 |
| 361 | Basic Circle Structure(2D) | 1 |
| 362 | Circle Circle Area(2D) | 1 |
| 363 | Circle Circle Intersection(2D) | 1 |
| 364 | Circle Circle Relation(2D) | 1 |
| 365 | Circle Line Intersection(2D) | 1 |
| 366 | Circle Line Relation(2D) | 1 |
| 367 | Circle Point Relation(2D) | 1 |
| 368 | Tangent Lines from Point(2D) | 2 |
| 369 | Tangent Lines from Circle(2D) | 2 |
| 370 | Maximum Circle Cover(2D) | 2 |
| 371 | Maximum Inscribed Circle(2D) | 2 |
| 372 | Triangle Circle Intersection(2D) | 2 |
| 373 | Polygon Circle Intersection(2D) | 2 |
| 374 | Circle Union(2D) | 3 |
| 375 | Centroid of a Polygon(2D) | 1 |
| 376 | Convex Hull(2D) | 1 |
| 377 | Diameter of a Convex Polygon(2D) | 2 |
| 378 | Extreme Vertex(2D) | 2 |
| 379 | Geometric Median(2D) | 2 |
| 380 | Convexity Check(2D) | 1 |
| 381 | Check if Point is in Convex(2D) | 2 |
| 382 | Check if Point is in Polygon(2D) | 2 |
| 383 | Minimum Enclosing Circle(2D) | 2 |
| 384 | Minimum Enclosing Rectangle(2D) | 2 |
| 385 | Polygon Line Intersection(2D) | 2 |
| 386 | Width of a Polygon(2D) | 2 |
| 387 | Winding Number(2D) | 2 |
| 388 | Dist from Point to Polygon(2D) | 2 |
| 389 | Dist from Polygon to Line(2D) | 2 |
| 390 | Dist from Polygon to Polygon(2D) | 2 |
| 391 | Maximum Dist from Polygon to Polygon(2D) | 3 |
| 392 | Tangents from Point to Polygon(2D) | 3 |
| 393 | Polygon Union(2D) | 3 |
| 394 | Minkwoski Sum(2D) | 2 |
| 395 | Geometry 3D Everything | 3 |
| 396 | Basic Point Structure(3D) | 1 |
| 397 | Basic Line Structure(3D) | 1 |
| 398 | Plane Structure(3D) | 1 |
| 399 | 3D Coordinates to 2D | 1 |
| 400 | Distance from Segment to Point(3D) | 2 |
| 401 | Distance from Triangle to Point(3D) | 2 |
| 402 | Distance from Triangle to Segment(3D) | 2 |
| 403 | Distance from Triangle to Triangle(3D) | 2 |
| 404 | Distance from Segment to Segment(3D) | 2 |
| 405 | Plane Plane Intersection | 2 |
| 406 | Basic Sphere Structure | 1 |
| 407 | Sphere Line Intersection | 2 |
| 408 | Segment Segment Intersection on Sphere | 2 |
| 409 | Oriented Angle on Sphere | 2 |
| 410 | Area on The Surface of The Sphere | 2 |
| 411 | Winding Number 3D | 3 |
| 412 | Convex Hull 3D | 3 |
| 413 | Picks Theorem | 1 |
| 414 | Closest Pair of Points | 1 |
| 415 | All Pair Segment Intersection. | 3 |
| 416 | Dynamic Convex Hull | 3 |
| 417 | Delaunay Triangulation | 3 |
| 418 | Voronoi Diagram | 3 |
| 419 | Half Plane Intersection | 2 |
| 420 | Dynamic Half Plane Intersection | 3 |
| 421 | Onion Decomposition | 3 |
| 422 | Point Location | 3 |
| 423 | Convex Hull Intersection using Minkowski | 2 |
| 424 | Generating Points without Collinear Triplets | 2 |
| 425 | Maximum Area of a Triangle from given Lengths | 3 |
| 426 | Vertical decomposition | 3 |

**Game theory**

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| --- | --- | --- |
| **#** | **Title** | **Difficulty** |
| 427 | Grundy Number | 1 |
| 428 | Green Hackenbush on Trees and Graphs | 2 |
| 429 | Blue Red HackenBush | 3 |
| 430 | Games on Arbitrary Graphs | 2 |
| 431 | Matching Game On A Graph | 2 |
| 432 | Nimber | 3 |

**Miscellaneous**

|  |  |  |
| --- | --- | --- |
| **#** | **Title** | **Difficulty** |
| 433 | Bigint | 2 |
| 434 | Two Pointers | 1 |
| 435 | Binary Search | 1 |
| 436 | Fraction Binary Search | 3 |
| 437 | Ternary Search | 1 |
| 438 | Parallel Binary Search | 2 |
| 439 | Josephus Problem | 1 |
| 440 | Permutation with no Arithmetic Progression | 1 |
| 441 | Balanced Brackets | 1 |
| 442 | Knight Moves in Infinity Grid | 2 |
| 443 | Bishop Placement | 1 |
| 444 | Gray Code | 1 |
| 445 | MEX of all Subarrays | 3 |
| 446 | Dates | 1 |
| 447 | Schreier–Sims Algorithm | 3 |
| 448 | Expression Parsing | 1 |
| 449 | Randomized Algorithms | 2 |
| 450 | K-th Root of a Permutation | 3 |
| 451 | Matroid Intersection | 3 |
| 452 | SMAWK Algorithm | 3 |
| 453 | Lindstrom–Gessel–Viennot lemma | 3 |