

Solving Paradigms

Brute Force

Iterative Brute Force

CF - 31A Worms Evolution
 Uva - 1041 Vito's Family
 Uva - 102 Ecological Bin Packing
 Uva - 10487 Closest Sums
 CF - 1068 Choosing Laptop
 Uva - 10365 Blocks
 CF - 7A Kalshevitch and Chess
 Uva - 366 Perfect Cubes
 Uva - 11621 Small Factors
 Uva - 617 Nonstop Travel
 Uva - 154 Recycling
 Uva - 703 Triple Ties: The Organizer's Nightmare
 Uva - 10483 The Sum Equals the Product

Uva - 435 Block Voting
 Uva - 10662 The Wedding
 Uva - 11205 The broken pedometer
 Uva - 11342 Three-square
 Uva - 1237 Expert Enough?
 Uva - 1260 Sales
 Uva - 735 Dart-a-Mania
 CF - 25A IQ test
 CF - 231A Team
 CF - 214A System of Equations
 CF - 520A Pangram
 CF - 189A Cut Ribbon
 Uva - 725 Division
 Uva - 441 Lotto
 Uva - 11565 Simple Equations
 Uva - 11742 Social Constraints
 Uva - 12455 Bars
 Uva - 259 Quirksonic Squares

CF - 443B Kolya and Tandem Repeat

CF - 316E1 Summer Homework

CF - 18C Stripe

CF - 698A Bets

CF - 94B Friends

CF - 38A Chess

CF - 30A Accounting

CF - 29A Split Problem

CF - 32A Reconnaissance

CF - 88A Chord

CF - 38C Blinds

CF - 53A Autocomplete

Uva - 443 Humble Numbers

Uva - 640 Self Numbers

CF - 977B Two-gram

CF - 909B New Year and Buggy Bot

CF - 58C Trees

Uva - 11959 Dice

CF - 653C Bear and Up-Down

CF - 63C Bulls and Cows

CF - 300B Coach

Uva - 30C Joseph

CF - 231C To Add or Not to Add

CF - 1175C Electrification

Uva - 1154B Blackboard Bonanza

Uva - 1146A Even Parity

Uva - 10309 Turn the Lights Off

specialists

solution without doubles

Recursive Brute Force (Backtracking)

Uva - 52 Prime Ring Problem

Uva - 167 The Sultan's Successors

Uva - 624 CD

Uva - 10360 Rat Attack

Uva - 12346 Water Gate Management

Uva - 1249 Overlapping Scenes

Uva - 487 Boggle Blitz

Uva - 10475 Help the Leaders

Uva - 11515 Cranes

Uva - 131 The Psychic Poker Player

Uva - 234 Switching Channels

Uva - 639 Don't Get Rooked

Uva - 298 Safebreaker

CF - 121A Lucky Sum

CF - 371C Hamburgers

Uva - 729 The Hamming Distance Problem

Uva - 10344 23 out of 5

CF - 80C Heroes

CF - 558 Smallest number

CF - 114B PFAST Inc.

CF - 96B Lucky Numbers (easy)

Uva - 1251 Repeated Substitution with Sed

Uva - 11201 The problem of the crazy linguist

Uva - 1064 Network

Uva - 12515 Movie Police

pupils

pupils

pupils

pupils

solvable with bfs, complexity analysis: factorial not exponential

pupils

pupils

pupils

pupils

Binary Search

Dynamic Programming

Max 2D Range Sum

UVa - 10667 Largest Block
UVa - 10502 Counting Rectangles
Longest Increasing Subsequence (LIS)

UVa - 10534 Wavio Sequence

SPOJ - MCARCa
Knapsack

Coin Change

Probabilities | Yandex 16 | Table Tennis Tournament

Yandex 16
UMa - 11974

| | | | | | |
|------------------------|-----------------------|--------|---|-------------|--|
| UVa - 1974 | Switch The Lights | easy | Knapsack | seenX | sufficiently fast, enough to use switches at most once, solvable with Dfs state-space search |
| UVa - 10503 | The dominos solitaire | easy | | | |
| CF - 5800 | Kefa and Dishes | easy | | | |
| UVa - 10364 | Square | medium | dimension compression | seenX | |
| UVa - 10318 | Security Panel | medium | grids | specialists | solvable with backtracking |
| UVa - 10149 | Yahzee | medium | dimension compression, tedious | specialists | solvable with backtracking (CP hint) |
| UVa - 11472 | Beautiful Numbers | medium | number systems, preprocessing | specialists | |
| CF - 8C: | Looking for Order | medium | | specialists | dp body must be optimized to pass time limit |
| SPOJ - HIST2 Histogram | | | | | |
| UVa - 11832 | Account Book | hard | offset, printing the solution | | need bitmasks for printing the solution efficiently |
| UVa - 10038 | Tug of War | hard | knapack variant, optimization with bitmasks | | |

Digits

| | | | | | |
|------------------------|-----------------------|--------|------------------------------|--------------------|--|
| UVa - 11258 | String Partition | easy | | specialists | |
| CF - 509C | Sums of Digits | easy | | | generate function that memoizes invalid paths so it won't try them again, solvable with greedy |
| CF - 584 | Expression | hard | heavy implementation | | leading zeros handling as DP goes from right to left, solvable with dijkstra |
| CF - 431D | Random Task | hard | binary search, combinatorics | | proving monotonicity of binary search nice editorial solution |
| Grids and Paths | | | | | |
| UVa - 926 | Walking Around Wisely | easy | DAGs | | |
| UVa - 10874 | Segments | medium | DAGs | specialists | |
| CF - 2B | The least round way | hard | print solution | | zero special case |

TSP

Other Techniques

Data Structures

Linear Data Structures

1D Array Manipulation

CF - 66E Petya and Post

CF - 706E

Queue

CF - 788A

UVa - 12207 That Is Your Queue
UVa - 1449 Erasing and Writing

Bit Manipulation

Non-linear Data Structures

Union-Find Disjoint Sets

UVa - 12086 Potentiometers

POJ SuperMemo T-shirts medium hard

Graphs

Basic Algorithms

| | | | | | | | |
|-------------------------------------|-------------------------------|--------|---|--|--------|--|-----------|
| CF - 450 | Ice Cave | easy | flood fill | | | | |
| UVa - 10004 | Bicloning | easy | Bipartite Graph Check | | | | |
| UVa - 1168 | Pick up sticks | easy | topological sort | | | | |
| UVa - 11561 | Getting Gold | easy | grids, dfs | | | | |
| UVa - 10507 | Waking up brain | easy | direct connectivity check | | | | |
| CF - 2460 | Colorful Graph | easy | graph representation | | pupils | | |
| CF - 61D | Eternal Victory | easy | dfs | | pupils | | seen |
| UVa - 11991 | Easy Problem from Ruja Liu? | easy | graph representation | | | | |
| UVa - 19685 | Galactic Bonding | easy | dsu, connected components | | | | |
| UVa - 1263 | Mines | easy | SCC, DAG compression, geometry | | | | |
| UVa - 11938 | Come and Go | easy | SCC | | | | composite |
| UVa - 626 | Ecosystem | easy | connectivity, brute force | | | | |
| CF - 691D | Swaps in Permutation | easy | CC, sortings, permutations | | | | |
| CF - 608 | Serial Time! | easy | connected components, grids | | | | |
| CF - 24A | Ring road | easy | rings | | | | |
| CF - 687A | NP-Hard Problem | easy | bipartite Graph Check | | | | |
| CF - 226 | System Administrator | easy | constructive, articulation points, star/complete graphs | | | | |
| GYM - 100200 | Burning Bridges | easy | standard bridges | | | | |
| CF - 999E | Reachability from the Capital | easy | SCC | | | | |
| CF - 1176E | Cover it! | medium | bipartite check | | | | |
| CF - 103B | Cthulhu | medium | connected components, cycle check | | | | seen |
| CF - 405E | Graph Cutting | medium | dfs, dsu, stats | | | | seen |
| UVa - 10765 | Doves and bombs | medium | articulation points | | | | |
| UVa - 11504 | Dominos | medium | SCC, DAG compression | | | | |
| UVa - 11396 | Claw Decomposition | medium | bipartite Graph Check | | | | |
| UVa - 295 | Fatman | medium | connected components, binary search, geometry | | | | |
| UVa - 10973 | Triangle Counting | medium | graph representation, brute force | | | | |
| CF - 106D | Treasure Island | medium | grids, brute force, next processing (with counting) | | | | |
| CF - 427C | Checkposts | medium | SCC | | | | |
| CF - 558C | Amr and Chemistry | medium | bfs, implicit graph, brute force | | | | |
| CF - 680E | Rear and Square Grid | medium | connected components, grids, 2D sliding window | | | | |
| CF - 723D | Lakes in Berland | medium | connected components, grids | | | | |
| CF - 723F | st-Spanning Tree | medium | connected components, dsu, greedy | | | | |
| CF - 598D | Igor in the Museum | medium | connected components, grids | | | | |
| GYM - 100201 | Don't Go Left | medium | dfs, cycles | | | | |
| SPOJU - CAPC Capital City | | medium | SCC | | | | |
| SPOJU - BOTII The Bottom of a Graph | | medium | SCC | | | | |
| CF - 329B | Birdian Forest | medium | bfs | | | | |
| CF - 1063B | Labyrinth | medium | bfs | | | | |
| UVa - 10876 | Factory Robot | hard | connected components, binary search, geometry | | | hint: enough to minimize left or right, because R - L == const | |
| UVa - 1092 | Tracking Bio-bots | hard | graph compression, grids, connectivity | | | composite | |
| UVa - 13004 | Exposing corruption | hard | bipartite coloring, DP | | | solvable with brute force | |
| CF - 196B | Infinite Maze | hard | bfs, cycles | | | composite | |
| CF - 788C | The Great Mixing | hard | bfs, small cycle length, math | | | nice editorial solution | seen |
| CF - 987F | AND Graph | hard | connected components, bitmasks | | | | |
| CF - 369D | Valera and Fools | hard | bfs, counting | | | | |

Minimum Spanning Tree (MST)

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|--------------|---------------------------------|--------|--|------|-------------|----------------------------------|--|
| UVa -11857 | Driving Range | easy | | 8.4 | | | |
| UVa -1160 | X-Plorians | easy | | 10.4 | | | |
| UVa -544 | Heavy Cargo | easy | maximiz | | | count edges not taken by kruskal | |
| UVa -10147 | Highways | easy | minimum spanning subgraph | | | solvable with FW | |
| UVa -10397 | Connect the Campus | easy | minimum spanning subgraph | | specialists | | malformed input: empty line after last test case |
| UVa -1174 | IP-TV | easy | | | | | |
| UVa -10098 | The Tourist Guide | easy | maximiz | | | | |
| UVa -10462 | Is There A Second Way Left? | easy | 2nd mat | | specialists | | solvable with FW |
| UVa -1208 | Oreon | easy | | | | | |
| UVa -10841 | Traffic Flow | easy | max spanning tree | | | | |
| UVa -10363 | Arctic Network | easy | minimum spanning forest | | specialists | | solvable with binary search and DSU |
| UVa -1235 | Anti Brute Force Lock | easy | | | pupils | | |
| GYM - 100204 | Oil Deal | medium | | | add to plan | | |
| UVa -11267 | The Hire-a-Coder Business Model | medium | accept -ve weights, bipartite check | | specialists | | |
| UVa -10307 | How Many Aliens in Borz Mag | hard | SSSS, dfs, grids | | | | |
| UVa -1040 | The Traveling Judges Problem | hard | brute force on all subsets, dfs, output formatting | | | | composite |
| CSA - 1000 | Fold Down | | | | | | |

Single-Source Shortest Path

| | | | | | |
|--------------------------------------|--------|---|-------------|-------------|--------------------------------|
| UVa - 10422 Knights in FEN | easy | bfs | | | |
| UVa - 11693 Speedy Escape | easy | binary search | | | needs good complexity analysis |
| UVa - 12134 Switch Bulbs | easy | bfs, bitmasks, state-space search | specialists | | composite |
| UVa - 928 Eternal Truths | easy | bfs, grids, state-space search | | | |
| UVa - 12600 Unlock the Lock | easy | bfs | | | |
| UVa - 710 The Game | easy | dijkstra, grids | | | |
| UVa - 10047 The Monocycle | easy | bfs, grids, state-space search | specialists | | |
| UVa - 11487 Gathering Food | medium | bfs, counting paths | | | |
| UVa - 859 Chinese Checkers | medium | bfs | | | |
| UVa - 11634 Hotel booking | medium | dijkstra, state-space search | | | |
| UVa - 12070 Invite Your Friends | medium | dijkstra, grids, state-space search, brute force | | | composite |
| UVa - 10557 XYZZY | medium | bellman-ford, maximization, connectivity, positive cycles | specialists | specialists | important |
| UVa - 11721 Instant View of Big Bang | medium | bellman-ford, negative cycles, printing the solution | | | important, solvable with SCC |
| UVa - 1233 USHER | medium | single-sink dijkstra, bottle replacement | | | |
| CF - 598 Shortest Path | medium | bfs, state-space search, printing the solution | specialists | | |
| CF - 968 Volleyball | medium | graph conversion | | | |
| GYM - 10220 Driving Straight | medium | bfs, printing the solution | | | |
| CF - 2298 Planets | medium | dijkstra, bipartite search sets | specialists | | |

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|---------------------------------|--------|-----------------|-------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| CF - 342C Paths and Trees | medium | | put in plan | | | | | | | | | | | | | | | | | | | | | | |
| CF - 144D Missile Silos | medium | | | | | | | | | | | | | | | | | | | | | | | | |
| CF - 716D Complete The Graph | hard | | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 10166 Travel | hard | dijkstra | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 1202 Finding Nemo | hard | dijkstra, grids | | | | | | | | | | | | | | | | | | | | | | | |
| CF - 1005708 ShortestPath Query | hard | | | | | | | | | | | | | | | | | | | | | | | | |

All-Pairs Shortest Path (Floyd-Warshall's Algorithm)

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|--|--------|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| UVA - 12319 Edgetown's Traffic Jam | easy | | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 567 Risk | easy | standard | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 821 Page Hopping | easy | standard | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 11047 The Scrooge Co Problem | easy | standard | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 1056 Degrees of Separation | easy | standard | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 10171 Meeting Prof. Miguel... | easy | standard | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 925 No more prerequisites, please! | easy | transitive closure, transitive reduction of a DAG | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 439 Knight Moves | easy | | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 423 MPI Mailstrom | easy | | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 521 Gossiping | medium | graph connectivity, lcm | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 125 Numbering Paths | medium | counting paths | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 334 Identifying Concurrent Events | medium | connectivity, transitive closure, topological sort + fenwick trees (for large graphs) | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 1243 Polynomial-time Reductions | hard | transitive closure, SCC, transitive reduction of a DAG | | | | | | | | | | | | | | | | | | | | | | | |

Network Flow

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|--|--------|-----------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| UVA - 563 Crimewave | easy | | | | | | | | | | | | | | | | | | | | | | | | |
| CF - 498C Array Operations | medium | number theory | | | | | | | | | | | | | | | | | | | | | | | |
| GYM - 100200 Unique Attack | medium | min cut, Dinic with scaling | | | | | | | | | | | | | | | | | | | | | | | |
| Topcoder Graduation | medium | | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 10983 Buy one, get the rest free | hard | binary search, max flow | | | | | | | | | | | | | | | | | | | | | | | |

Minimum Cost (Max) Flow

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|-------------------------------------|--------|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| UVA - 10806 Dijkstra, Dijkstra. | medium | minimum cost flow | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 10746 Crime Wave - The Sequel | medium | MCMF on bipartite graph | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 10594 Data Flow | medium | minimum cost flow | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 11301 Great Wall of China | medium | MCMF with SPFAs, grids, vertex capacity | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 10888 Warehouse | medium | SSSP (dfs), MCMF on bipartite graph | | | | | | | | | | | | | | | | | | | | | | | |
| CF - 863F Almost Permutation | medium | | | | | | | | | | | | | | | | | | | | | | | | |

Trees

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|---------------------------------------|--------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|------|-----------|--|--|--|--|--|--|--|
| CF - 507C Guess Your Way Out! | easy | binary tree, heap representation | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 11350 Stem-Brood Tree | easy | | | | | | | | | | | | | | | | | | | | | | | | |
| CF - 682C Alyona and the Tree | easy | max suffix sum | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 615 Is it a tree? | easy | dfs | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 11108 Tautology | easy | expression evaluation, bitmasks, brute force | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 699 The Falling Leaves | easy | pre-order | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 679 Dropping Balls | easy | heap representation | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 12186 Another Crisis | easy | dfs, sortings | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 599 The Forrest for the Trees | easy | tree properties | | | | | | | | | | | | | | | | | | | | | | | |
| CF - 698B Fix a Tree | easy | dfs, constructive algorithm | | | | | | | | | | | | | | | | | | | | | | | |
| CF - 34D Road Map | easy | stacks | | | | | | | | | | | | | | | | | | | | | | | |
| CF - 369C Valera and Elections | easy | tree traversal | | | | | | | | | | | | | | | | | | | | | | | |
| GYM - 100247 Of Groups and Rights | easy | | | | | | | | | | | | | | | | | | | | | | | | |
| Topcoder IncompleteBST | easy | implementation | | | | | | | | | | | | | | | | | | | | | | | |
| CF - 763A Timofey and a tree | easy | | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 11131 Close Relatives | medium | tree traversal | | | | | | | | | | | | | | | | | | | | | | | |
| CF - 675D Tree Construction | medium | | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 11234 Expressions | medium | post-order or level order, binary tree, stacks, queues | | | | | | | | | | | | | | | | | | | | | | | |
| CF - 82C General Mobilization | medium | implementation, priorityqueues | | | | | | | | | | | | | | | | | | | | | | | |
| CF - 898 Widget Library | medium | implementation, dp, treemaps, expression parsing | | | | | | | | | | | | | | | | | | | | | | | |
| CF - 77C Beavermuncher-0xFF | medium | dfs, greedy | | | | | | | | | | | | | | | | | | | | | | | |
| CF - 337D Book of Evil | medium | tree diameter, dfs | | | | | | | | | | | | | | | | | | | | | | | |
| CF - 486D Valid Sets | medium | dis, combinatorics | | | | | | | | | | | | | | | | | | | | | | | |
| CF - 707D Persistent Bookcase | medium | dis, persistence | | | | | | | | | | | | | | | | | | | | | | | |
| CF - 455C Civilization | medium | diameter, dsu | | | | | | | | | | | | | | | | | | | | | | | |
| CF - 570D Tree Requests | hard | euler walk, prefix xor, bitmasks, binary search | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 10805 Cockroach Escape Networks | hard | minimum diameter spanning tree | | | | | | | | | | | | | | | 11.3 | important | | | | | | | |

DP on Trees

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|---|--------|--------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Topcoder PendingTasks | easy | | | | | | | | | | | | | | | | | | | | | | | | |
| UVA - 11307 Alternative Arborescence | medium | DP, min chromatic sum | | | | | | | | | | | | | | | | | | | | | | | |
| CF - 440D Berland Federalization | medium | firstChild & nextSibling | | | | | | | | | | | | | | | | | | | | | | | |
| CF - 110C Lucky Tree | medium | up & down dp | | | | | | | | | | | | | | | | | | | | | | | |
| CF - 219D Choosing Capital for Treeland | medium | up & down dp | | | | | | | | | | | | | | | | | | | | | | | |
| CF - 618D Hamiltonian Spanning Tree | medium | firstChild & nextSibling | | | | | | | | | | | | | | | | | | | | | | | |
| CF - 855C Helga Hufflepuff's Cup | medium | firstChild & nextSibling | | | | | | | | | | | | | | | | | | | | | | | |
| CF - 500D New Year Santa Network | medium | up & down, expectations | | | | | | | | | | | | | | | | | | | | | | | |
| SPOJ - VOCV-Conjunctions | medium | DP | | | | | | | | | | | | | | | | | | | | | | | |
| CF - 461B Appleman and Tree | medium | counting | | | | | | | | | | | | | | | | | | | | | | | |

Euler Walk

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CF - 343D Water Tree | medium | segment trees | | | | | | | | | | | | | | | | | | | | | | | |

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Mathematics

Ad-hoc

Brute Force

| | | | | | |
|-------------|---------------------|--------|------------------------|----------|---|
| CF - 915A | Garden | easy | divisibility | | |
| UVA - 264 | Count on Cantor | easy | grid | | |
| UVA - 697 | Jack and Jill | easy | simulation | filtered | rational numbers enumeration complex output formatting |
| UVA - 616 | Coconuts, Revisited | medium | divisibility, coprimes | | observation: remaining coconuts on last day must be at least $N \times (N-1)$ |
| UVA - 10257 | Dick and Jane | medium | | | mathematical insight |
| UVA - 10427 | Naughty Sleepy Boys | medium | brute force | | |

Formulas

| | | | | | |
|-------------|----------------------------|--------|--|--|------------------------------------|
| CF - 415B | Mashmokh and Tokens | easy | floor and ceiling | | |
| UVA - 10698 | #81 | easy | | | |
| UVA - 10970 | Big Chocolate | easy | | | |
| UVA - 10114 | Simple calculations | easy | | | |
| CF - 638A | Home Numbers | easy | | | |
| CF - 70A | Cookies | easy | linear recurrence | | |
| CF - 80B | Depression | easy | | | |
| CF - 90A | Cableway | easy | | | |
| UVA - 913 | Joanna and the Odd Numbers | easy | | | |
| CF - 787A | The Monster | easy | | | |
| CF - 233B | Non-square Equation | medium | quadratic equation, brute force | | |
| CF - 185A | Plant | medium | fast exponentiation | | |
| CF - 702D | Road to Post Office | medium | | | solvable with DP with matrix power |
| UVA - 10519 | !! Really Strange !! | medium | geometry, arithmetic progression | | |
| CF - 337C | Quiz | medium | floor and ceiling, fast exponentiation | | |

Logarithms and Powers

| | | | | | |
|-------------|-----------------------|--------|--|--|--|
| UVA - 113 | Power of Cryptography | easy | | | |
| UVA - 11636 | Hello World! | easy | | | |
| UVA - 107 | The Cat in the Hat | medium | | | W must be $\text{pow}(N, k)$ and H must be $\text{pow}(N+1, k)$ for some k, 1 special case |

Polynomials

| | | | | | |
|-------------|---------------------|------|--|----------|---------|
| UVA - 392 | Polynomial Showdown | easy | polynomials, output formatting | filtered | useless |
| UVA - 12318 | Digital Roulette | easy | Ruffini-Horner's method, brute force, treesets | | |

Base Number Systems

| | | | | | |
|--------------|---|--------|------------------------------|--|---------------------------------------|
| CF - 1017B | The Bits | easy | bitwise or, couting | | |
| UVA - 575 | Skew Binary | easy | | | |
| CF - 928 | Binary Number | easy | | | |
| UVA - 10931 | Parity | easy | toBinaryString(), bitCount() | | |
| UVA - 11185 | Ternary | easy | | | |
| CF - 219B | Special Offer! Super Price 999 Bourles! | easy | | | |
| UVA - 389 | Basically Speaking | easy | | | solvable with built-in functions only |
| CF - 39H | Multiplication Table | easy | | | |
| GYM - 10000E | Alien Communicating Machines | easy | | | |
| GYM - 100201 | Yellow Code | medium | bit manipulation | | |

Find the pattern

| | | | | | |
|-------------|---------------------|------|-----------------------|--|--------------------------|
| CF - 55A | Flea travel | easy | mathematical insights | | solvable with simulation |
| UVA - 10161 | Ant on a Chessboard | hard | | | solvable with simulation |

Others

| | | | | | |
|-------------|-------------------------------|--------|--|--------------------|--------------------------------|
| UVA - 49A | Simply Subsets | easy | set operations, treesets | | |
| UVA - 13 | Street Numbers | easy | hardcoding | | |
| CF - 42A | Guliy — to the kitchen! | easy | inequalities, greedy | | |
| CF - 697B | Bamicle | easy | scientific notation | | |
| UVA - 350 | Pseudo-Random Numbers | easy | cycle finding | | |
| UVA - 10591 | Happy Number | easy | cycle finding | | |
| UVA - 10013 | Super long sums | easy | long arithmetic | | |
| CF - 111A | Petya and Inequalities | easy | greedy | | |
| CF - 1175B | Catch Overflow! | easy | infinity | | |
| CF - 1176A | Divide it! | easy | | | |
| CF - 863C | 1-2-3 | medium | cycle finding | add to specialists | |
| CF - 65A | Harry Potter and Three Spells | medium | | | |
| CF - 81C | Average Score | medium | mathematical insights, sortings | | |
| CF - 712C | Memory and De-Evolution | medium | greedy | | see proof in tutorial comments |
| UVA - 209 | Repeating Decimals | medium | repeating decimals, cycle finding, long division | | important |
| CF - 939E | Maximize! | medium | mean, two pointers | | |

Combinatorics

pigeonhole Principle

| | | | | | |
|-----------|------------|--------|----|--|--|
| CF - 577A | Modulo Sum | medium | dp | | |
|-----------|------------|--------|----|--|--|

Fibonacci Numbers

| | | | | | |
|-------------|-----------------------------|-----------|---|-----|--|
| UVA - 10579 | Fibonacci Numbers | very easy | | | |
| UVA - 11000 | Bee | easy | | | |
| UVA - 10662 | Connect the Cable Wires | easy | dp | 9.1 | |
| UVA - 10689 | Yet another Number Sequence | easy | pisano period | 9.1 | 9.2 |
| UVA - 11161 | Help My Brother (II) | easy | | | |
| UVA - 11089 | Bi-binary Number | medium | Fibonacci Number System | 9.2 | |
| UVA - 11780 | Miles 2 Km | medium | fibonacci growth, DP | | |
| UVA - 1258 | Nowhere Money | medium | two-step interpretation, zerkendorf theorem | | PE because of blanks at the end of each line |
| CF - 551D | Guk2 and Binary Operations | medium | | | solvable with DP with matrix power |

Binomial Coefficient

| | | | | | |
|-------------|---|--------|-------------------------------------|--|---|
| CF - 919B | Perfect Number | easy | | | use stars and bars to prove max answer, check bonus questions in tutorial |
| CF - 817B | Makes And The Product | easy | | | |
| CF - 294C | Shaass and Lights | easy | | | |
| UVA - 10105 | Polynomial Coefficients | easy | | | combinatorial proof of binomial coefficient |
| UVA - 324 | Extrapolation Using a Difference Table | easy | pascal's triangle | | |
| CF - 397C | On Number of Decompositions into Multipli | medium | stars and bars, prime factorization | | |
| ASC 28 - D | Dinner Problem | medium | take at least 1 | | |

Extended Euclidean Algorithm

| | | | | | | | | |
|-------------------------------|---|-----------|------------------------------|--|--|--|--|--|
| Topcoder | StoneGameStrategist | hard | ladder nim | | | | | |
| Sprague-Grundy Theorem | | | | | | | | |
| UVa - 11534 | Say Goodbye to Tic-Tac-Toe | easy | | | | | | |
| Codechef | - AS A String Game | easy | | | | | | |
| SPOJ | J - MATG Matrix Game | medium | | | | | | |
| Timus | - 1465 Pawn Game | easy | | | | | | |
| CF | - 317D Game with Powers | medium | hardcoding with dp | | | | | |
| CF | - 335C More Reclamation | medium | | | | | | |
| CF | - 87C Interesting Game | hard | dp | | | | | |
| Topcoder | LongLongNim | hard | cycle finding | | | | | |
| Topcoder | Roxor | hard | | | | | | |
| Others | | | | | | | | |
| CF | - 959A Mahmoud and Ehab and the even-odd game | easy | strategy finding | | | | | |
| CF | - 74B Train | easy | greedy, simulation | | | | | |
| CF | - 79A Bus Game | easy | simulation | | | | | |
| CF | - 914B Conan and Agasa play a Card Game | medium | strategy finding | | | | | |
| CF | - 78C Beaver Game | medium | strategy finding | | | | | |
| CF | - 49D Game | medium | brute force | | | | | |
| CF | - 55C Pie or die | medium | strategy finding | | | | | |
| CF | - 705B Spider Man | medium | | | | | | |
| CF | - 197A Plate Game | medium | strategy finding | | | | | |
| CF | - 388C Fox and Card Game | hard | greedy | | | | | |
| BigInteger | | | | | | | | |
| UVa - 424 | Integer Inquiry | very easy | BigInteger addition | | | | | |
| UVa - 10193 | All You Need Is Love | easy | gcd | | | | | |
| UVa - 10235 | Simply Emirp | easy | Probabilistic primality test | | | | | |
| UVa - 10494 | If We Were a Child Again | easy | long division and modulo | | | | | |
| | | | | try implementing it without BigInteger | | | | |
| Others | | | | | | | | |
| UVa - 10164 | Number Game | hard | parity | | | | | |
| UVa - 547 | DDF | medium | sequences, numDiv, DP | | | | | |
| | | | | tricky input | | | | |
| Canonical Form | | | | | | | | |
| CF - 560D | Equivalent Strings | medium | | | | | | |
| | | | | general day | | | | |

Strings

Ciphering

UVa - 10878 Decode the tape easy observation

Frequency Count

| | | | |
|-------------|-----------------------|--------|---------------------|
| CF - 43B | Letter | easy | |
| UVa - 11588 | Image Coding | easy | 2D Arrays |
| CF - 50B | Choosing Symbol Pairs | easy | counting principle |
| UVa - 10252 | Common Permutation | easy | |
| CF - 1176C | Lose it! | medium | subsequences |
| CF - 551B | ZgukistringZ | medium | |
| CF - 335A | Banana | medium | brute force, greedy |
| CF - 254C | Anagram | medium | greedy |

pupils
pupils
specialists

Subsequences

| | | | |
|-------------|--------------------|--------|----------------------------|
| UVa - 10340 | All in All | easy | subsequence check |
| CF - 91A | Newspaper Headline | medium | next occurrence processing |

Regular Expression (Regex)

UVa - 409 Excuses, Excuses! easy

String Matching

| | | | |
|----------|--------------------------|------|------------------------|
| CF - 79C | Beaver | easy | two pointers, greedy |
| CF - 23A | You're Given a String... | easy | brute force |
| CF - 39J | Spelling Check | easy | prefix/suffix matching |

Prefix Function (KMP)

| | | | |
|---------------------------------|--------------------------|--------|--|
| UVa - 455 | Periodic Strings | easy | string compression |
| UVa - 10298 | Power Strings | easy | string compression |
| UVa - 11576 | Scrolling Sign | easy | |
| UVa - 11475 | Extend to Palindrome | easy | suffix palindromes |
| UVa - 11888 | Abnormal 89's | easy | prefix/suffix palindromes |
| UVa - 12467 | Secret Word | easy | palindromes |
| UVa - 889 | Named Extension Dialing | easy | treesets |
| SPOJ - NHAY | A Needle in the Haystack | easy | standard, on the fly |
| CF - 535D | Tavas and Malekas | easy | |
| CF - 126B | Password | medium | |
| CF - 346B | Lucky Common Subsequence | medium | DP, prefix automaton |
| HackerRank - Cutting the String | | hard | counting, string compression |
| CF - 25E | Test | hard | permutations, greedy |
| Topcoder - InfiniteSoup | | hard | number theory |
| CF - 471D | MUH and Cube Walls | hard | clever optimizations |
| | | | solvable with rabin-karp (+ modified queues) |

Aho Corasick

| | | | |
|---------------------------------------|------------------|--------|--------------------------|
| UVa - 10679 | I Love Strings!! | easy | |
| codechef - LYIMusic & Lyrics | | easy | |
| codechef - QN Lucy and Question Marks | | easy | dp |
| codechef - FA Favourite Numbers | | medium | dp |
| CF - 163E | e-Government | medium | euler walk, fenwick tree |

easily solvable with suffix automaton
needs (time & memory) optimization
—
—
—
sensitive to time & memory

Grids

| | | | |
|-------------|--------------------|------|------------------------------------|
| UVa - 10010 | Where's Waldo? | easy | backtracking, pruning |
| UVa - 422 | Word-Search Wonder | easy | backtracking, pruning |
| UVa - 604 | The Boggle Game | easy | backtracking, generation, treesets |
| UVa - 11283 | Playing Boggle | easy | backtracking, pruning |
| UVa - 736 | Lost in Space | easy | backtracking, pruning |

uDebug hint

Suffix Structures

| | | | |
|--------------|-----------------|--------|-------------------------------|
| CF - 27D | Good Substrings | easy | distinct substrings |
| UVa - 760 | DNA Sequencing | easy | LCS |
| CF - 113B | Petr# | medium | KMP |
| CF - 456D | A Lot of Games | medium | game theory, min-max strategy |
| SPOJ - MORSE | | hard | DP |

experts
experts

solvable with hashing
TYPO: A word can exist more than once in dictionary, deal with them as different words

Suffix Array

| | | | |
|-------------|------------|------|--|
| UVa - 11512 | GATTACA | easy | longest repeated substring |
| UVa - 11107 | Life Forms | hard | LCS variant, modified queues, sliding window |

solvable with suffix trie
solvable with suffix automaton

Suffix Automaton

| | | | |
|--------------|--------------------------------|--------|----------------------------|
| SPOJ - SUBLI | Lexographical Substring Search | easy | kth substring |
| UVa - 719 | Glass Beads | easy | smallest cyclic shift |
| UVa - 1223 | Editor | easy | longest repeated substring |
| CF - 427D | Edit & Catch | medium | occurrences |
| UVa - 1254 | Top 10 | hard | substring occurrence |

optimize for time > memory

solvable with DP in O(n^2) - check editorial

Others

| | | | |
|--------------|------------------------|--------|--|
| UVa - 257 | Palindromes | easy | brute force |
| CF - 70B | Text Messaging | easy | expression parsing, greedy |
| CF - 61B | Hard Work | easy | expression parsing, brute force |
| CF - 59C | Title | easy | palindromes, greedy |
| CF - 81B | Sequence Formatting | easy | expression parsing |
| CF - 34C | Page Numbers | easy | expression parsing, output formating |
| UVa - 644 | Immediate Decodability | easy | |
| | | | solvable with built-in function StartsWith() |
| CF - 278B | New Problem | easy | brute force, treesets |
| CF - 777D | Cloud of Hashtags | easy | greedy |
| CF - 62B | Tyndex.Brome | medium | next/last occurrence preprocessing |
| CF - 56C | Corporation Mall | medium | expression parsing, treemaps |
| GYM - 100241 | Similar Strings | medium | canonical form |
| | | | nice solution |

solvable with built-in function StartsWith()

String Hashing

| | | | |
|-------------|-----------------------------------|--------|------------------|
| SPOJ - ADAC | Ads and Spring Cleaning | easy | rabin-karp |
| CF - 245H | Queries for Number of Palindromes | medium | solvable with DP |

Geometry

Points and Line

| | | | | | | |
|---|-----------|--|--|-------------|--|--|
| UVa - 152 Tree's Crowd | very easy | | | | | |
| CF - 706A Beni-taxi | easy | brute force | | | | |
| UVa - 10283 Railway | easy | closest point to line segment | | | | |
| UVa - 10357 Playball !!! | easy | | | | | |
| UVa - 587 There's treasure everywhere! | easy | translation, path tracing, simulation | | pupils | | |
| UVa - 378 Intersecting Lines | easy | line intersection | | | | |
| UVa - 10586 Center of Symmetry | easy | | | | | |
| CF - 498A Crazy Town | easy | | | 7.4 | | |
| UVa - 184 Laser Lines | easy | collinear test, brute force | | | | |
| CF - 667A Pouring Rain | easy | physics | | specialists | | |
| UVa - 10167 Birthday Cake | easy | brute force | | | | |
| UVa - 273 Jack Straws | easy | line segment intersection, dsu, connected components | | | solvable with FW | |
| UVa - 356 Square Pegs And Round Holes | easy | brute force | | | | |
| CF - 257C View Angle | easy | | | | | |
| CF - 1047B Cover Points | easy | line equation | | | | |
| UVa - 191 Intersection | medium | rectangle-line segment intersection | | 7.3 | two opposite corners are given not necessarily top left and bottom right | |
| UVa - 837 Light and Transparencies | medium | | | 7.4 | | |
| UVa - 920 Sunny Mountains | medium | | | 7.1 | | |
| UVa - 10250 The Other Two Trees | medium | translation | | 7.2 | parallelogram not rectangle | |
| UVa - 10469 How Far? | medium | | | | | |
| UVa - 10902 Pick-up Sticks | medium | segment-segment intersection | | 7.1 | clarification: maximum number of sticks at any moment = 1000 | |
| CF - 671A Recycling Bottles | medium | sortings | | | EPS handling: read editorial | |
| CF - 593B Anton and Lines | medium | | | | | |
| CF - 65C Harry Potter and the Golden Snitch | medium | binary search, physics | | | | |
| CF - 552D Vanya and Triangles | medium | brute force, counting, treemaps | | | | |
| CF - 404B Marathon | medium | modular arithmetic | | specialists | | |
| GYM - 100201 The Minimal Angle | medium | rotations, formula | | | | |
| CF - 10320 Barcelonian Distance | medium | | | | | |
| UVa - 1189A Genius MJ | hard | transformation | | 7.4 | | |
| UVa - 1151A Logo 2 | hard | | | 7.3 | | |
| UVa - 1157A Colliding Traffic | hard | brute force, formula derivation, physics | | | solvable with binary search | |
| CF - 590B Chip'n Dale Rescue Rangers | hard | binary search, physics | | | | |
| GYM - 1001! Empty Triangles | hard | | | | my solution: $O(n^2 \log n)$. Package solution with hashmap and sets O(n) | |

Triangles (plus Circles)

| | | | | | | |
|-------------|---------------------------------|-----------|--------------------------------|--|-----|-----------------------------|
| UVa - 438 | The Circumference of the Circle | very easy | | | | |
| UVa - 11152 | Colourful Flowers | very easy | | | 7.2 | |
| UVa - 143 | Orchard Trees | easy | inside triangle | | 7.3 | |
| CF - 7668 | Mahmoud and a Triangle | easy | sorting | | | nice author solution: fibon |
| UVa - 10195 | The Knights Of The Round Table | easy | | | 7.1 | |
| FC - 10 | Ancient Berland Circus | easy | regular polygons | | | bad precision |
| UVa - 10286 | Trouble with a Pentagon | easy | | | 7.1 | |
| UVa - 10991 | Region | easy | | | | |
| UVa - 10210 | Romeo and Juliet ! | medium | | | 7.3 | |
| UVa - 10387 | Billiard | medium | | | 7.4 | |
| UVa - 10577 | Bounding Box | medium | regular polygons | | 7.2 | |
| UVa - 10794 | The Laurel-Hardy Story | medium | | | 7.1 | |
| UVa - 11904 | Soya Milk | medium | | | | |
| UVa - 10734 | Triangle Partitioning | medium | treeselets, precision handling | | | |
| CF - 407A | Triangle | medium | | | | tricky cases |

UVa - 11164

| | | | | | | |
|--------------|------------------------|--------|-------------------------------|--|----------|-----------|
| UVa - 10000 | Packing polygons | easy | | | | |
| UVa - 10209 | Is This Integration ? | medium | | | 7.1 | |
| UVa - 10283 | The Kissing Circles | medium | | | 7.3 | |
| UVa - 10678 | The Grazing Cow | medium | | | 7.4 | |
| UVa - 1388 | Graveyard | medium | | | 7.2 | |
| GYM - 102020 | Circles | medium | circle-circle intersection | | | |
| CF - 342C | Cupboard and Balloons | medium | | | 7.3 | |
| CF - 617C | Watering Flowers | easy | | | | |
| CF - 140A | New Year Table | easy | kissing circles | | | |
| UVa - 10823 | Of Circles and Squares | easy | brute force | | | |
| UVa - 10947 | Bear with me, again.. | easy | connected components, FW, dsu | | | |
| UVa - 10681 | Expanding Rods | easy | binary search | | filtered | precision |

Quadrilateral

| | | | | | |
|-------------|---------------------------|--------|-------------------------|-----|---|
| UVa - 11207 | The easiest way | easy | | 7.3 | |
| UVa - 142 | Mouse Clicks | easy | rectangles, brute force | | |
| UVa - 688 | Mobile Phone Coverage | easy | rectangles, brute force | | |
| UVa - 638 | Finding Rectangles | easy | rectangles, brute force | | |
| CF - 749B | Parallelogram is Back | easy | | | |
| UVa - 11639 | Guard the Land | medium | | 7.4 | |
| UVa - 12256 | Making Quadrilaterals | medium | | 7.1 | |
| CS - 3408 | Moving Area Quadrilateral | medium | areas, brute force | | compend solution using friend area function |

3D Objects

| DB Objects | | | | | | |
|---------------------------------|--------|---|--|-----|--|---|
| UVa - 815 Flooded! | medium | | | 7.4 | | |
| UVa - 737 Gleaming the Cubes | medium | | | 7.3 | | |
| UVa - 1280 Curvy Little Bottles | hard | solid of revolution, binary search, polynomials | | | | |
| UVa - 10075 Airlines | medium | spheres, FW | | | | |
| UVa - 10897 Travelling Distance | easy | great-circle distance | | | | Needed two EPS because of binary search composite |

Polygons

| | | | | |
|-------------|---|------|-------------|-----|
| UVa - 478 | Points in Figures: Rectangles, Circles, Triangles | easy | | 7.3 |
| UVa - 11265 | The Sultan's Problem | easy | polygon cut | 7.4 |

| Ad-hoc Implementation | | | |
|---------------------------|-----------------------------------|-----------|--|
| CF - 977A | Wrong Subtraction | very easy | |
| CF - 946A | Partition | very easy | |
| CF - 1041A | Heist | very easy | |
| CF - 1005A | Tanya and Stairways | very easy | |
| CF - 908A | New Year and Counting Cards | easy | logic |
| CF - 426B | Sereja and Mirroring | easy | |
| CF - 641A | Little Artem and Grasshopper | easy | nice |
| CF - 669A | Little Artem and Presents | easy | |
| CF - 195A | Let's Watch Football | easy | formula |
| CF - 436B | Om Nom and Spiders | easy | |
| CF - 182B | Vasya's Calendar | easy | seen discussed |
| CF - 677C | Vanya and Label | easy | number systems |
| CF - 3C | Tic-tac-toe | easy | |
| CF - 4B | Center Alignment | easy | output formatting |
| CF - 147A | Punctuation | easy | output formatting |
| CF - 63B | Settlers Training | easy | |
| CF - 705A | Hunt | easy | |
| CF - 62A | A Student's Dream | easy | |
| CF - 71B | Progress Bar | easy | |
| CF - 57A | Square Earth? | easy | |
| CF - 88B | Keyboard | easy | |
| CF - 56B | Spolt Permutation | easy | |
| CF - 46B | T-shirts from Sponsor | easy | |
| CF - 48A | Rock-paper-scissors | easy | |
| CF - 40A | Find Color | easy | |
| CF - 51A | Cheaterius's Problem | easy | |
| CF - 10A | Power Consumption Calculation | easy | |
| CF - 32B | Borze | easy | |
| CF - 47B | Coins | easy | |
| CF - 8A | Train and Peter | easy | |
| UVa - 10082 | WERTYU | easy | hardcoding |
| GYM - 100015 | Hidden Code | easy | good example for writing small codes |
| CF - 1016A | Death Note | easy | |
| CF - 1174B | Ehab Is an Odd Person | easy | sortings |
| CF - 382 | Arithmetic Progression | medium | cases handling, sortings |
| CF - 69C | Game | medium | tremaps, brute force |
| CF - 83B | Doctor | medium | sortings, math |
| CF - 93A | Frames | medium | tricky cases |
| CF - 96C | Hockey | medium | strings |
| CF - 433C | Ryukou's Memory Note | medium | sortings, math |
| GYM - 100202 | Ranking | medium | |
| CF - 863C | Yet Another Array Queries Problem | medium | backward thinking |
| CF - 34E | Collisions | hard | brute force, physics |
| GYM - 100202 | Linear Programming Dual | hard | parsing |
| Constructive Algorithms | | | |
| CF - 417C | Football | easy | |
| CF - 331A | The Closest Pair | easy | |
| CF - 62D | Dividing Island | easy | |
| CF - 78B | Easter Eggs | easy | |
| CF - 49C | Disposition | easy | number theory |
| CF - 85A | Domino | easy | divisibility insights |
| CF - 219A | Lesha and array splitting | easy | |
| CF - 1174A | Ehab Falls To Be Thanos | easy | sortings |
| CF - 590A | Median Smoothing | medium | |
| CF - 663A | Rebus | medium | |
| CF - 59D | Team Arrangement | medium | sortings |
| CF - 82B | Sets | medium | |
| CF - 161B | Discounts | medium | sortings |
| CF - 370C | Mittens | medium | |
| CF - 550E | Brackets in Implications | medium | logic |
| CF - 949A | Zebra | medium | |
| CF - 1148C | Crazy Diamond | medium | |
| CF - 1174D | Ehab and the Expected XOR Problem | medium | bitmasks, XORing |
| CF - 754C | Vladik and chat | hard | assignment problem variant, string parsing |
| GYM - 100004 | Octagons | hard | reduction |
| Time Waster | | | |
| CF - 151B | Phone Numbers | easy | output formatting |
| CF - 71D | Solitaire | medium | card game, brute force |
| Aces (for speed practice) | | | |
| CF - 686A | Free Ice Cream | very easy | |
| CF - 702A | Maximum Increase | very easy | |
| CF - 688A | Opponents | easy | |
| Random Solutions | | | |
| GYM - 100015 | Identity Checker | easy | choose x as a multiple of PI |

Specific Problems and Algorithms