

Solving Paradigms

Brute Force

Iterative Brute Force

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State-Space Search

[illegible]

Greedy

[illegible]

Dynamic Programming

Max 1D Range Sum

Max 2D Range Sum

Longest Increasing S

| | |
|------------|-------------------|
| Topcoder | AutoMarket |
| UVa - 340D | Bubble Sort Graph |

Knapsack

Coin Change

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Bitmasks

Digits

Grids and Paths

TSP

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| | | | |
|--------------|--------------------------------------|-----------|--|
| Uva - 10690 | Expression Again | medium | bottom-up, subset sum |
| UVa - 11701 | Cantor | medium | circular recurrence handling, number systems |
| CF - 132C | Logo Turtle | medium | |
| Uva - 1240 | ICPC Team Strategy | medium | bitmasks |
| CF - 33C | Wonderful Randomized Sum | medium | prefixes and suffixes |
| CF - 321B | Ciel and Duel | medium | DP idea |
| CF - 486D | Increase Sequence | medium | counting |
| CF - 393D | Tower of Hanoi | medium | |
| SPOJ - MIXT1 | Mixtures | medium | Matrix Chain Multiplication, prefix sum |
| CF - 225C | Barcode | medium | |
| CF - 404D | Minesweeper 1D | medium | offset trick for complexity O(nm + m(y-x)) instead of O(nm + my) |
| CF - 383D | Antimatter | medium | neat implementation |
| GYM - 10020C | Think Positive | medium | nice technique: has D&C + DP solution, check editorial |
| Topcoder | Encoding Trees | medium | |
| CF - 999F | Cards and Joy | medium | printing the solution |
| CF - 933A | A Twisty Movement | medium | counting |
| CF - 909C | Python Indentation | medium | brute force |
| CF - 1000D | Yet Another Problem On a Subsequence | medium | counting |
| CF - 1114D | Flood Fill | medium | |
| CF - 1176F | Destroy it! | medium | tutorial: nice correlation with LCS |
| CF - 855E | Salazar Slytherin's Locket | hard | mod state |
| CF - 13C | Sequence | hard | masks, digits |
| Uva - 10029 | Erik Step Ladders | hard | |
| Uva - 11285 | Exchange Rates | hard | trie |
| Uva - 711 | Dividing up | hard | composite, Malformed input: has uppercase letters |
| CF - 279E | Beautiful Decomposition | hard | important |
| ASC 36 - B | Divisible Substrings | very hard | solvable with backtracking + search space reduction |
| | | | solvable with greedy |

Other Techniques

| | | | | | |
|--------------|-----------------------------|--------|---------------------------------------|--------|--|
| Uva - 11536 | Smallest Sub-Array | easy | sliding window | pupils | constraints: K >= 1 |
| Uva - 1121 | Subsequence | easy | sliding window | pupils | if no answer print 0 |
| CF - 701C | They Are Everywhere | easy | sliding window | pupils | |
| CF - 378B | Semifinals | easy | two pointers | | |
| CF - 239B | Easy Tape Programming | easy | next processing | | solvable with simulation |
| CF - 180C | STL | easy | recursion, EBNF | | |
| Uva - 442 | Matrix Chain Multiplication | easy | D&C, EBNF, bracket matching | | |
| CF - 224B | Array | easy | | | |
| GYM - 100201 | Railroad Sort | medium | D&C, constructive algorithms | | |
| CF - 69E | Subsegments | medium | sliding window, treemaps, treesets | pupils | |
| CF - 57B | Martian Architecture | medium | lazy processing | | |
| CF - 89C | Chip Play | medium | path compression, brute force, grids | | |
| CF - 56E | Domino Principle | medium | path compression, sortings | | |
| CF - 375B | Maximum Submatrix 2 | medium | next processing, brute force | | |
| CF - 279C | Ladder | medium | next processing | | solvable with binary search + prefix sum |
| CF - 237C | Primes on Interval | medium | sliding window, primes | | |
| CF - 1148B | Born This Way | medium | two pointers | | |
| CF - 1175C | Array Splitting | medium | prefix sum, sortings | | |
| GYM - 10000J | Largest Square | medium | sliding window | pupils | |
| CF - 1175E | Minimal Segment Cover | medium | binary lifting, lazy update | | |
| GYM - 10019I | Little Jumper | hard | ternary search, projectile trajectory | | |
| CF - 888G | Xor-MST | hard | D&C, constructive algorithms | | Bonvaka's algorithm |

Data Structures

Linear Data Structures

1D Array Manipulation

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2D Array Manipulation

[illegible]

Stack

[illegible]

Queue

[illegible]

Deque

[illegible]

Bit Manipulation

| | | | |
|--------------|------------------------------|------|-----------------------------------|
| U/a - 11760 | Brother Ant, Please feed us! | easy | bisets |
| CF - 60A | Where Are My Flakes? | easy | bisets |
| UVa - 11933 | Splitting Numbers | easy | papils |
| CS | Max Or Subarray | easy | |
| GYM - 100861 | Lamps of the Mind | hard | bisets (own library), brute force |

Non-linear Data Structures

| code | problem | difficulty | topics | tags | status | notes |
|-------------|--|------------|---|------|--------|--|
| Uva - 11849 | CD | very easy | treeseets | | easy | |
| CF - 519D | A and B and Interesting Substrings | easy | treemaps, prefix sum | | easy | |
| CF - 637B | Chat Order | easy | treeseets | | easy | |
| Uva - 11288 | Conformity | easy | treemaps | | easy | |
| Uva - 10138 | CDVII | easy | treemaps, sortings, implementation | | easy | |
| Uva - 11136 | Hoax or what | easy | treemaps | | easy | |
| Uva - 10282 | Babelfish | easy | treemaps | | easy | |
| Uva - 11062 | Andy's Second Dictionary | easy | treeseets | | easy | |
| Uva - 11967 | Hic-Hac-Hoe | easy | treeseets, infinite grids, brute force | | easy | |
| CF - 105A | Transmigration | easy | treemaps | | easy | |
| CF - 702B | Powers of Two | easy | treemaps, brute force | | easy | |
| CF - 75B | Facetook Priority Wall | easy | treemaps, sortings, implementation | | easy | |
| CF - 87B | Vasya and Types | easy | tree/hashmaps | | easy | |
| Uva - 156 | Ananagrams | easy | treemaps, anagrams | | easy | |
| CF - 205D | Little Elephant and Cards | easy | treemaps, treeseets | | easy | |
| CF - 808D | Array Division | easy | hashsets | | easy | |
| CF - 436A | Feed with Candy | medium | priority queues | | easy | |
| CF - 721D | Maxim and Array | medium | priority queues, constructive algorithm | | easy | |
| CF - 681C | Heap Operations | medium | priority queues, greedy | | easy | |
| CF - 1005E1 | Median on Segments (Permutations Editor) | medium | treemaps, arrays, ranges, counting | | easy | |
| CF - 220C | Little Elephant and Shifts | medium | treeseets, maps, cyclic shifts | | easy | |
| CF - 3D | Least Cost Bracket Sequence | hard | priority queues, greedy, bracketing | | easy | key idea: try a solution, then optimize, important |

Union-Find Disjoint Sets

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Fenwick Trees (Binary-Indexed Trees / BIT)

| | | |
|----------------|-------------------------------|---------------------|
| Uva - 12086 | Potentiometers | easy |
| CF - 459D | Pashmak and Parmida's problem | easy |
| CF - 597C | Subsequences | medium |
| TG - floatingM | Floating Median | medium findIndex |

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Graphs

Basic Algorithms

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Minimum Spanning Tree (MST)

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Single-Source Shortest Path

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Ad-hoc

| | |
|-------------|---------------------|
| CF - 915A | Garden |
| UVa - 264 | Count on Cantor |
| UVa - 697 | Jack and Jill |
| UVa - 616 | Coconuts, Revisited |
| UVa - 10257 | Dick and Jane |
| UVa - 10427 | Naughty Sleepy Boys |

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|-------------|---------------------------|--------|--|
| CF - 415B | Mashmohk and Tokens | easy | floor and ceiling |
| Uva - 10696 | !91 | easy | |
| Uva - 10970 | Big Chocolate | easy | |
| Uva - 10014 | Simple calculations | easy | |
| CF - 638A | Home Numbers | easy | |
| CF - 70A | Cookies | easy | linear recurrence |
| CF - 80B | Depression | easy | |
| CF - 90A | Casleway | easy | |
| Uva - 913 | Joana 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 | |
| Uva - 10519 | !! Really Strange !! | medium | geometry, arithmetic progression |
| CF - 337C | Quiz | medium | floor and ceiling, fast exponentiation |

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|-------------|---------------------------|--------|---|
| CF - 415B | Mashmoks and Tokens | easy | floor and ceiling |
| UVa - 10696 | #1 | easy | |
| UVa - 10970 | Big Chocolate | easy | |
| UVa - 10014 | Simple calculations | easy | |
| CF - 638A | Home Numbers | easy | |
| CF - 70A | Cookies | easy | linear recurrence |
| CF - 80B | Depression | easy | |
| CF - 90A | Cableway | easy | |
| UVa - 913 | Josna 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 solvable with DP with matrix power |
| CF - 702D | Road to Post Office | medium | |
| UVa - 10519 | !! Really Strange !! | medium | geometry, arithmetic progression |
| CF - 337C | Quiz | medium | floor and ceiling, fast exponentiation |

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

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

| | | | | |
|-------------|---|--------|------------------------------|---------------------------------------|
| CF - 1017B | The Bits | easy | bitwise or, counting | |
| 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 | | |
| CF - 394 | Multiplication Table | easy | | solvable with built-in functions only |
| GYM - 10000 | Alien Communicating Machines | easy | | |
| GYM - 10020 | Yellow Code | medium | bit manipulation | |

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|--------------|---|--------|---------------------------------------|
| CF - 1017B | The Bits | easy | bitwise or, counting |
| UVa - 575 | Skew Binary | easy | |
| CF - 62B | 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 - 100008 | Alien Communicating Machines | easy | |
| GYM - 100201 | Yellow Code | medium | bit manipulation |

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

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|-------------|-------------------------------|--------|--------------------------|
| Uva - 496 | Simply Subsets | easy | set operations, treesets |
| Uva - 138 | Street Numbers | easy | hardcoding |
| CF - 424 | Guliy - to the kitchen! | easy | inequalities, greedy |
| CF - 667B | Barnicle | easy | scientific notation |
| Uva - 360 | Numbers-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 | cycle |
| CF - 863C | 1-2-3 | medium | cycle finding |
| CF - 65A | Harry Potter and Three Spells | medium | |
| CF - 41C | Antesque Score | medium | mathematical insights, s |
| CF - 712C | Memory and De-Evolution | medium | greedy |
| Uva - 202 | Repeating Decimals | medium | repeating decimals, cycl |
| CF - 939E | Maximize! | medium | mean, two pointers |

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pigeonhole Principle

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|-----------|------------|--------|---|
| CF - 577B | Modulo Sum | medium | d |
|-----------|------------|--------|---|

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|-------------|-----------------------------|-----------|---|
| Uva - 10579 | Fibonacci Numbers | very easy | |
| Uva - 11000 | Bee | easy | |
| Uva - 10862 | Connect the Cable Wires | easy | |
| Uva - 10589 | Yet another number Sequence | easy | dp |
| Uva - 11151 | Help My Brother (II) | easy | pisano period |
| Uva - 11089 | Fibonacci Number | medium | Fibonacci Number System |
| Uva - 11780 | Miles 2 Km | medium | fibonacci growth, DP |
| Uva - 1258 | Nowhere Money | medium | two-step interpretation, zerkendorf's theorem |
| CF - 551D | GukiZ and Binary Operations | medium | |

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Extended Euclidean Algorithm

| | | | | | | | | |
|-------------|--------------------------|--------|----------------------|-------------|---|--|--|------|
| Uva - 10104 | Euclid Problem | easy | | | | | | |
| Uva - 10673 | Play with Floor and Ceil | easy | | specialists | | | | |
| Uva - 10090 | Marbles | medium | diophantine equation | specialists | | | | seen |
| Uva - 10633 | Rare Easy Problem | medium | diophantine equation | specialists | important, solvable with mathematical reduction and brute force | | | seen |

Others

| | | | | | | | |
|--------------|------------------------------------|-----------|--|--|-------------------------------------|---------------------------------------|------|
| CF - 935A | Fafa and his Company | very easy | count divisors | | | | |
| CF - 1047A | Little C Loves 3 I | very easy | divisibility | | | | |
| Uva - 11461 | Square Numbers | easy | perfect squares | | | | |
| Uva - 10110 | Light, more light | easy | perfect squares | | | | |
| Uva - 10606 | Opening Doors | easy | perfect squares, binary search, BigInteger | | | | |
| Uva - 10929 | You can say 11 | easy | divisibility | | | | |
| Uva - 11344 | The Huge One | easy | divisibility, BigInteger | | | | |
| Uva - 11042 | Complex, difficult and complicated | easy | complex numbers | | | | |
| Uva - 756 | Biorhythms | easy | Chinese remainder theorem | | | | |
| Uva - 10880 | Colin and Ryan | easy | divisors generation, stacks, queues | | | | seen |
| CF - 454C | Lucky Tickets | easy | divisibility | | | | |
| CF - 597A | Divisibility | easy | divisibility | | | | |
| Topcoder | RugSizes | easy | divisibility, brute force | | | | |
| CF - 71C | Round Table Knights | medium | divisors generation/prime factorization, brute force | | | | |
| GYM - 100241 | For the Honest Election | medium | divisors generation | | | | |
| Topcoder | Refactoring | medium | divisors generation, dp | | | | |
| Topcoder | DivisorInc | medium | divisibility, dp | | | | seen |
| Topcoder | SquareFree | medium | moebius function | | | | |
| CF - 448E | Divisors | hard | divisors generation, D&C | | optimization with sieve to handle p | observation: all divisors of divisors | seen |

Permutations

| | | | | | | |
|-------------|--------------------------------|--------|-------------------------------|--|-----------|--|
| CF - 359B | Permutation | easy | observation | | | |
| CF - 180F | Mathematical Analysis Rocks! | easy | | | | |
| UVa - 10098 | Generating Fast | easy | next_permutation | | | |
| UVa - 11371 | Number Theory for Newbies | easy | | | | |
| UVa - 941 | Permutations | medium | kb permutation | | | |
| UVa - 11525 | Permutation | medium | kb permutation, segment trees | | composite | |
| UVa - 11282 | Mixing Involutions | medium | fixed points | | | |
| CF - 67B | Restoration of the Permutation | medium | constructive algorithm | | | |
| CF - 48D | Permutations | medium | constructive algorithm | | | |

Probability Theory

| | | | | | | |
|-------------|---------------------------|--------|---------------------------------------|--|--|--|
| CF - 77B | Falling Anvils | easy | continuous probability | | | |
| UVA - 10491 | Cows and Cars | easy | formula | | | |
| UVA - 542 | France '98 | easy | D&C | | | |
| UVA - 10056 | What is the Probability ? | easy | formula | corner cases | | |
| UVA - 11628 | Another lottery | easy | | | | |
| UVA - 12114 | Bachelor Arithmetic | easy | | | | |
| Topcoder | Benford's Law | easy | expected value | | | |
| Topcoder | Probability Tree | easy | ifs, conditional probability | | | |
| UVA - 11181 | Probability Given | medium | conditional probability | | | |
| UVA - 12461 | Airplane | medium | "D | | | |
| CF - 107B | Basketball Team | medium | combinatorics | | | |
| CF - 109B | Lucky Probability | medium | brute force, lucky numbers generation | | | |
| Topcoder | Range Game | medium | | | | |
| Topcoder | Chip Race | medium | dp | nice solution | | |
| Topcoder | Genetic Crossover | medium | dfs | | | |
| Topcoder | Bag Of Devoiring | medium | dp, bitmasks | | | |
| Topcoder | Random FA | medium | dp | | | |
| Topcoder | Anti Matter | medium | gcd | | | |
| CF - 1044E | Wayne and Magic Matrix | hard | expectation, dp, algebra | | | |
| CF - 234B | Let's Play Osu! | hard | expectation | restate the problem, important combinatorics trick | | |
| UVA - 11500 | Vampires | hard | gamble's ruin problem | | | |
| Topcoder | Test Scores | hard | mean and standard deviation | | | |
| Topcoder | Package Shipping | hard | dp | | | |
| Topcoder | Hangman42 | hard | dp | | | |

Probability with DF

| | | | | | | |
|-------------|---------------|--------|-----------------------------------|--|--|--|
| UVA - 10759 | Dice Throwing | easy | DP | | | |
| Topcoder | PrimsSoccer | easy | addition rule, independent events | solvable with backtracking | | |
| Topcoder | TopFive | easy | DP | | | |
| UVA - 11021 | Tribles | medium | DP, independent events | | | |
| CF - 16E | Fish | hard | bitmasks, preprocessing | Solve it on SPOJ with Java | | |

Game Theory

Decision Tree (Minimax Strategy)

| | | | | | | |
|--------------|------------------------|--------|-----------------------------|--|--|--|
| Uva - 10891 | Game of Sum | easy | dp, two pointers | | | |
| Uva - 10404 | Bachet's Game | easy | dp | | | |
| Uva - 10578 | The Game of 31 | easy | dp | | | |
| Uva - 11489 | Integer Game | easy | strategy finding | | | |
| Uva - 10536 | Game of Euler | medium | dp, bitmasks | | | |
| GYM - 100015 | Fighting for Triangles | medium | dp | | | |
| Uva - 847 | A Multiplication Game | medium | strategy finding | | | |
| Uva - 10111 | Find the Winning Move | medium | dp, implementation | | | |
| Uva - 10368 | Euchre's Game | medium | pattern finding | | | |
| Uva - 12293 | Box Game | medium | pattern finding | | | |
| Uva - 12469 | Stones | medium | dp or pattern finding | | | |
| CF - 69D | Dot | medium | dp | | | |
| CF - 63E | Sweets Game | medium | dp, bitmasks, preprocessing | | | |
| CF - 538E | Demiurges Play Again | medium | trees, constructive | | | |
| Topcoder | CakeParty | hard | strategy finding | | | |

Nim Game

| | | | | | | |
|-------------|--------------------|-----------|-----------------|--|-----------|--|
| U/a - 10165 | Stone Game | very easy | | | | |
| U/a - 11311 | Exclusively Edible | easy | | | | |
| CF - 15C | Industrial Nim | medium | xor on interval | | important | |

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Ciphering

Frequency

| | |
|-----------|--------------|
| CF - 551B | ZgukistringZ |
| CF - 335A | Banana |

Regular Express

| | | | |
|----------|-----------------------|------|----------------------|
| CF - 79C | Beaver | easy | two pointers, greedy |
| CF - 22A | You've Given a String | easy | brute force |

Prefix Function (KMP)

| | | | |
|-----------|----------------------|------|--------------------|
| Uva-11470 | Scolling sign | easy | |
| Uva-11475 | Extend to Palindrome | easy | suffix palindromes |

| | |
|-------------|-----------------|
| UVa - 12467 | Secret Word |
| UVa - 886 | Named Extension |

codechef - QM Luc

UVa - 60

| | |
|-----------|----------------|
| UVa - 760 | DNA Sequencing |
|-----------|----------------|

Prefix Array

UVA - 11107 Suffix Automaton

| | | | |
|------------|--------|------|----------------------------|
| UVa - 1223 | Editor | easy | longest repeated substring |
|------------|--------|------|----------------------------|

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| Others | 1254 | 10 |
|--------|------|----|

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CF - 34C

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|----|-------|-----------|
| Of | 24011 | Questions |
|----|-------|-----------|

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Points and Lines

| | |
|-----------|---------------------------------|
| UVa - 438 | The Circumference of the Circle |
| UVa - 445 | Colourful Flowers |

UVa - 10005

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|-------------|-------------|
| UVA - 11207 | The easiest |
| UVA - 112 | Mouse Click |

| | |
|-----------|-------|
| UVa - 815 | Flood |
| UVa - 327 | Clear |

| | |
|-------------|----|
| UVa - 478 | Pd |
| UVa - 1126E | Th |

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Measures

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Geometric Sweep

Line Sweep

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Circle Sweep

[illegible]

Others

[illegible]

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Specific Problems and Algorithms

| | | | | |
|---------------|----------------------------------|--------|--|----------------------|
| UVA - 10017 | The Never Ending Towers of Hanoi | easy | tower of hanoi | 10. |
| UVA - 344 | Roman Digitis | easy | roman numerals | |
| UVA - 11616 | Roman Numerals | easy | roman numerals | |
| UVA - 12397 | Roman Numerals | easy | roman numerals | |
| UVA - 759 | The Return of the Roman Empire | easy | roman numerals | |
| CF - 61C | Capture Valerian | easy | roman numerals, base number systems | |
| UVA - 727 | Equation | easy | expression notation conversion | |
| UVA - 120 | Stacks of Flajjacks | easy | pancake sorting, greedy | |
| UVA - 1266 | Magic Square | easy | magic square | |
| GCJ 09 R2 - C | Stock Charts | medium | partially ordered sets, bipartite matching | link |