**Data Structures and Algorithms**

1. Binary Search : [Tutorial, Problems](https://www.topcoder.com/community/data-science/data-science-tutorials/binary-search/), [Tutorial, Implementation](http://geeksquiz.com/binary-search/), [Problem](http://www.spoj.com/problems/AGGRCOW)
2. Quick sort : [Tutorial, Implementation](http://geeksquiz.com/quick-sort/), [Tutorial](http://help.topcoder.com/data-science/competing-in-algorithm-challenges/algorithm-tutorials/sorting/)
3. Merge Sort : [Tutorial, Implementation](http://geeksquiz.com/merge-sort/), [Tutorial](http://help.topcoder.com/data-science/competing-in-algorithm-challenges/algorithm-tutorials/sorting/)
4. Suffix Array : [Tutorial](http://web.stanford.edu/class/cs97si/suffix-array.pdf), [Tutorial, Implementation](http://discuss.codechef.com/questions/21385/a-tutorial-on-suffix-arrays), [Tutorial, Implementation](http://apps.topcoder.com/forums/;jsessionid=BC99925E58CB2628CA9AA3AFC13F6593?module=Thread&start=0&threadID=627379), [Problem](http://www.spoj.com/problems/SUBST1/), [Problem](http://www.codechef.com/problems/MOU1H)
5. Knuth-Morris-Pratt Algorithm (KMP) : [Tutorial](http://help.topcoder.com/data-science/competing-in-algorithm-challenges/algorithm-tutorials/introduction-to-string-searching-algorithms/), [Tutorial, Implementation](http://www.geeksforgeeks.org/searching-for-patterns-set-2-kmp-algorithm/), [Tutorial](http://keithschwarz.com/interesting/code/?dir=knuth-morris-pratt), [Problem](http://www.codechef.com/problems/TASHIFT)
6. Rabin-Karp Algorithm : [Tutorial, Implementation](http://www.geeksforgeeks.org/searching-for-patterns-set-3-rabin-karp-algorithm/), [Tutorial](http://help.topcoder.com/data-science/competing-in-algorithm-challenges/algorithm-tutorials/introduction-to-string-searching-algorithms/), [Problem](http://www.codechef.com/problems/SSTORY), [Problem](http://codeforces.com/problemset/problem/271/D)
7. Tries : [Tutorial, Problems](http://help.topcoder.com/data-science/competing-in-algorithm-challenges/algorithm-tutorials/using-tries/), [Tutorial : I,](http://www.geeksforgeeks.org/trie-insert-and-search/) [II](http://www.geeksforgeeks.org/trie-delete/), [Tutorial](https://threads-iiith.quora.com/Tutorial-on-Trie-and-example-problems), [Problem](http://www.spoj.com/problems/SUBXOR/), [Problem](https://icpcarchive.ecs.baylor.edu/index.php?Itemid=8&category=345&option=com_onlinejudge&page=show_problem&problem=2683), [Problem](http://www.codechef.com/problems/EST)
8. Depth First Traversal of a graph : [Tutorial, Implementation](http://www.geeksforgeeks.org/depth-first-traversal-for-a-graph/), [Tutorial, Problems](http://help.topcoder.com/data-science/competing-in-algorithm-challenges/algorithm-tutorials/introduction-to-graphs-and-their-data-structures-section-2/), [Problem](http://www.spoj.com/problems/PARADOX/), [Problem](http://www.spoj.com/problems/BUGLIFE/), [Problem](http://www.spoj.com/problems/PT07Z/)
9. Breadth First Traversal of a graph : [Tutorial, Implementation](http://www.geeksforgeeks.org/breadth-first-traversal-for-a-graph/), [Tutorial, Problems](http://help.topcoder.com/data-science/competing-in-algorithm-challenges/algorithm-tutorials/introduction-to-graphs-and-their-data-structures-section-2/), [Problem](http://www.codechef.com/problems/DIGJUMP), [Problem](http://www.spoj.com/problems/ONEZERO/), [Problem](http://www.spoj.com/problems/NAKANJ/), [Flood Fill](http://community.topcoder.com/tc?d1=tutorials&d2=findSolution&module=Static#floodfill)
10. Dijkstra's Algorithm : [Tutorial, Problems](http://help.topcoder.com/data-science/competing-in-algorithm-challenges/algorithm-tutorials/introduction-to-graphs-and-their-data-structures-section-3/), [Problem](http://www.codechef.com/problems/REN2013G), [Tutorial(greedy)](http://e-maxx.ru/algo/dijkstra), [Tutorial (with heap)](http://e-maxx.ru/algo/dijkstra_sparse), [Implementation](http://zobayer.blogspot.in/2009/12/dijkstras-algorithm-in-c.html), [Problem](http://www.spoj.com/problems/EZDIJKST/), [Problem](http://www.spoj.com/problems/SHPATH/)
11. Binary Indexed Tree : [Tutorial, Problems](http://community.topcoder.com/tc?d1=tutorials&d2=binaryIndexedTrees&module=Static), [Tutorial](http://codeforces.com/blog/entry/619), [Original Paper](http://citeseerx.ist.psu.edu/viewdoc/download;jsessionid=AB3AEBC0736E52FA815A3D4C633DE52F?doi=10.1.1.14.8917&rep=rep1&type=pdf), [Tutorial](http://sanugupta.wordpress.com/2014/08/29/binary-indexed-tree-fenwick-tree/), [Tutorial](http://cs.stackexchange.com/a/10541), [Problem](http://www.spoj.com/problems/HORRIBLE/), [Problem](http://www.spoj.com/problems/YODANESS/), [Problem](http://www.spoj.com/problems/INVCNT/), [Problem](http://www.spoj.com/problems/NICEDAY/), [Problem](http://www.spoj.com/problems/CTRICK/), [Problem](http://www.spoj.com/problems/DQUERY/), [Problem](http://www.spoj.com/problems/MCHAOS/)
12. Segment Tree (with lazy propagation) : [Tutorial, Implementation](http://se7so.blogspot.in/2012/12/segment-trees-and-lazy-propagation.html), [Tutorial](http://discuss.codechef.com/questions/38770/lazy-propagation), [Tutorial, Problems, Implementation](http://letuskode.blogspot.in/2013/01/segtrees.html), [Tutorial, Implementation and Various Uses](http://e-maxx.ru/algo/segment_tree), [Persistent Segment Tree](http://blog.anudeep2011.com/persistent-segment-trees-explained-with-spoj-problems/), problems same as BIT, [Problem](http://www.spoj.com/problems/HORRIBLE/), [Problem](http://www.codechef.com/problems/IDOLS)/*HLD is used as well*/
13. Z algorithm : [Tutorial, Problem](http://codeforces.com/blog/entry/3107), [Tutorial](https://www.cs.umd.edu/class/fall2011/cmsc858s/Lec02-zalg.pdf), problems same as KMP.
14. Floyd Warshall Algorithm : [Tutorial, Implementation](http://www.geeksforgeeks.org/dynamic-programming-set-16-floyd-warshall-algorithm/), [Problem](http://www.spoj.com/problems/AMR11F/), [Problem](http://community.topcoder.com/stat?c=problem_statement&pm=2356)
15. Sparse Table(RMQ) : [Tutorial, Problems](http://help.topcoder.com/data-science/competing-in-algorithm-challenges/algorithm-tutorials/range-minimum-query-and-lowest-common-ancestor/), [Tutorial, Implementation(C++)](http://mayanknatani.wordpress.com/2013/07/15/range-minimum-query/), [Java implementation](https://sites.google.com/site/indy256/algo/sparse_table_rmq)
16. Heap / Priority Queue / Heapsort : [Implementation, Explanation](http://www.sourcetricks.com/2011/06/c-heaps.html#.U9z8J_mSzfc), [Tutorial](http://pages.cs.wisc.edu/~vernon/cs367/notes/11.PRIORITY-Q.html), [Implementation](http://www.cprogramming.com/tutorial/computersciencetheory/heapcode.html), [Problem](http://www.codechef.com/problems/REVERSE), Chapter from CLRS
17. [Modular Multiplicative Inverse](http://comeoncodeon.wordpress.com/2011/10/09/modular-multiplicative-inverse/)
18. [nCr % M](http://discuss.codechef.com/questions/3869/best-known-algos-for-calculating-ncr-m)
19. Suffix Automaton : [Detailed Paper](http://www.cs.nyu.edu/~mohri/pub/nfac.pdf), [Tutorial, Implementation (I)](http://www.geeksforgeeks.org/searching-for-patterns-set-5-finite-automata/), [Tutorial, Implementation (II)](http://www.geeksforgeeks.org/pattern-searching-set-5-efficient-constructtion-of-finite-automata/), [Problem](http://www.codechef.com/problems/SUBQUERY), [Problem](http://www.codechef.com/problems/TSUBSTR), [Problem](http://www.codechef.com/problems/SSTORY), [Problem](http://www.codechef.com/problems/MOU1H), [Tutorial, Implementation](http://e-maxx.ru/algo/suffix_automata)
20. Lowest Common Ancestor : [Tutorial, Problems](http://www.topcoder.com/tc?d1=tutorials&d2=lowestCommonAncestor&module=Static), [Paper](http://www14.informatik.tu-muenchen.de/konferenzen/Jass08/courses/1/moufatich/El_Moufatich_Paper.pdf), [Paper](http://ab.inf.uni-tuebingen.de/people/fischer/lsa.pdf), [Problem](http://www.codechef.com/LTIME14/problems/TALCA), [Problem](http://www.spoj.com/problems/LCA/), [Problem](http://www.codechef.com/problems/TRIPS)
21. Counting Inversions : [Divide and Conquer](http://www.geeksforgeeks.org/counting-inversions/), [Segment Tree](https://www.quora.com/How-to-count-inversions-using-Segment-Tree-of-a-given-array), [Fenwick Tree](http://pavelsimo.blogspot.in/2012/09/counting-inversions-in-array-using-BIT.html), [Problem](http://www.codechef.com/problems/DYNAINV)
22. [Euclid's Extended Algorithm](http://discuss.codechef.com/questions/20842/a-tutorial-on-the-extended-euclids-algorithm)
23. Suffix Tree : [Tutorial](http://stackoverflow.com/questions/9452701/ukkonens-suffix-tree-algorithm-in-plain-english), [Tutorial](http://marknelson.us/1996/08/01/suffix-trees/), [Intro](http://www.geeksforgeeks.org/pattern-searching-set-8-suffix-tree-introduction/), Construction : [I](http://www.geeksforgeeks.org/ukkonens-suffix-tree-construction-part-1/), [II](http://www.geeksforgeeks.org/ukkonens-suffix-tree-construction-part-2/), [Implementation](http://marknelson.us/attachments/1996/suffix-trees/stree2006.cpp), [Implementation](http://www.sanfoundry.com/cpp-program-implement-suffix-tree/), [Problem](http://www.spoj.com/problems/LCS/), [Problem](http://www.codechef.com/OCT11/problems/REPSTR), [Problem](http://www.spoj.com/problems/BEADS/), [Problem](http://www.codechef.com/problems/TASTR)
24. Dynamic Programming : Chapter from CLRS(essential), [Tutorial, Problems](http://help.topcoder.com/data-science/competing-in-algorithm-challenges/algorithm-tutorials/dynamic-programming-from-novice-to-advanced/), [Problem](http://www.codechef.com/problems/LEPAINT), [Problem](http://www.codechef.com/problems/COINS), [Problem](http://www.codechef.com/problems/MARCHA1), [Problem](http://discuss.codechef.com/questions/47239/frogv-editorial), [Tutorial](https://www.quora.com/Are-there-any-good-resources-or-tutorials-for-dynamic-programming-DP-besides-the-TopCoder-tutorial), [Problem](http://www.codechef.com/problems/TSHIRTS), [Problem](http://community.topcoder.com/stat?c=problem_statement&pm=11566), [Problem](http://www.spoj.com/problems/SOCOLA/), [Longest Increasing Subsequence](http://www.geeksforgeeks.org/longest-monotonically-increasing-subsequence-size-n-log-n/), [Bitmask DP](http://codeforces.com/blog/entry/337), [Bitmask DP](http://www.ugrad.cs.ubc.ca/~cs490/sec202/notes/dp/DP%202.pdf), [Optimization](http://codeforces.com/blog/entry/8219), [Problem](http://www.spoj.com/problems/TRSTAGE/), [Problem](http://www.spoj.com/problems/LAZYCOWS/), [Problem](http://www.spoj.com/problems/HIST2/), [Problem](http://www.spoj.com/problems/MKPAIRS/), [Problem](http://www.spoj.com/problems/NKLEAVES/), [Problem](http://www.spoj.com/problems/DRAGON2/), [Problem](http://codeforces.com/contest/461/problem/B), DP on Trees : [I](http://www.iarcs.org.in/inoi/online-study-material/topics/dp-trees.php), [II](http://www.cs.berkeley.edu/~vazirani/s99cs170/notes/dynamic2.pdf)
25. Basic Data Structures : [Tutorial](http://help.topcoder.com/data-science/competing-in-algorithm-challenges/algorithm-tutorials/data-structures/), [Stack Implementation](https://www.cs.bu.edu/teaching/c/stack/array/), [Queue Implementation, Tutorial](http://geeksquiz.com/queue-set-1introduction-and-array-implementation/), [Linked List Implementation](http://codingfreak.blogspot.com/2009/08/implementation-of-singly-linked-list-in.html)
26. [Logarithmic Exponentiation](http://discuss.codechef.com/questions/20451/a-tutorial-on-fast-modulo-multiplication-exponential-squaring)
27. Graphs : [Definition, Representation](http://discuss.codechef.com/questions/17801/introduction-to-graphs-definitions-traversal-depth-first-search), [Definition, Representation](http://help.topcoder.com/data-science/competing-in-algorithm-challenges/algorithm-tutorials/introduction-to-graphs-and-their-data-structures-section-1/), [Problem](http://www.codechef.com/problems/DRGHTS), [Problem](http://www.codechef.com/problems/DIREL)
28. Minimum Spanning Tree : [Tutorial](https://www.ics.uci.edu/~eppstein/161/960206.html), [Tutorial, Kruskal's Implementation](http://www.geeksforgeeks.org/greedy-algorithms-set-2-kruskals-minimum-spanning-tree-mst/), [Prim's Implementation](http://www.geeksforgeeks.org/greedy-algorithms-set-5-prims-minimum-spanning-tree-mst-2/), [Problem](http://www.spoj.com/problems/MST/), [Problem](http://www.spoj.com/problems/CSTREET/), [Problem](http://www.spoj.com/problems/BLINNET/), [Problem](http://community.topcoder.com/stat?c=problem_statement&pm=7921&rd=10765), [Problem](http://community.topcoder.com/stat?c=problem_statement&pm=7643&rd=12058)
29. [Efficient Prime Factorization](http://www.geeksforgeeks.org/print-all-prime-factors-of-a-given-number/)
30. Combinatorics : [Tutorial, Problems](http://help.topcoder.com/data-science/competing-in-algorithm-challenges/algorithm-tutorials/basics-of-combinatorics/), [Problem](http://www.codechef.com/problems/BINTOUR), [Tutorial](http://apps.topcoder.com/forums/?mc=13&module=Thread&start=0&threadID=334598#335550)
31. Union Find/Disjoint Set : [Tutorial](http://www.cs.cornell.edu/~wdtseng/icpc/notes/graph_part4.pdf), [Tutorial, Problems](http://community.topcoder.com/tc?d1=tutorials&d2=disjointDataStructure&module=Static), [Problem](http://www.codechef.com/problems/DISHOWN), [Problem](http://www.spoj.com/problems/BLINNET/), [Problem](http://www.spoj.com/problems/CHAIN/)
32. Knapsack problem : [Solution, Implementation](http://www.geeksforgeeks.org/dynamic-programming-set-10-0-1-knapsack-problem/)
33. Aho-Corasick String Matching Algorithm : [Tutorial](http://www.cs.sun.ac.za/~lvzijl/courses/rw778/autappl/crous-hw2.pdf), [Implementation](https://gist.github.com/andmej/1233426), [Problem](http://www.codechef.com/problems/FAVNUM), [Problem](http://community.topcoder.com/stat?c=problem_statement&pm=11514&rd=14544), [Problem](http://community.topcoder.com/stat?c=problem_statement&pm=6017), [Problem](http://www.spoj.com/problems/WPUZZLES/)
34. Strongly Connected Components : [Tutorial, Implementation](http://www.geeksforgeeks.org/strongly-connected-components/), [Tutorial](http://www.cs.berkeley.edu/~vazirani/s99cs170/notes/lec12.pdf), [Problem](http://www.spoj.com/problems/BOTTOM/), [Problem](http://www.spoj.com/problems/BREAK/), [Problem](http://community.topcoder.com/stat?c=problem_statement&pm=8488&rd=11125)
35. Bellman Ford algorithm : [Tutorial, Implementation](http://www.geeksforgeeks.org/dynamic-programming-set-23-bellman-ford-algorithm/), [Tutorial, Implementation](http://compprog.wordpress.com/2007/11/29/one-source-shortest-path-the-bellman-ford-algorithm/), [Problem](http://community.topcoder.com/stat?c=problem_statement&pm=10580), [Problem](http://codeforces.com/problemset/problem/346/D)
36. Heavy-light Decomposition : [Tutorial, Problems](http://e-maxx.ru/algo/heavy_light), [Tutorial, Implementation](http://blog.anudeep2011.com/heavy-light-decomposition/), [Tutorial](http://wcipeg.com/wiki/Heavy-light_decomposition), [Implementation](http://apps.topcoder.com/forums/?mc=8&module=Thread&start=0&threadID=796128), [Implementation](http://pastie.org/private/ozpqitws20ylrj8a57tog), [Problem](http://www.spoj.com/problems/QTREE6/), [Problem](http://www.codechef.com/problems/PUSHFLOW), [Problem](http://www.codechef.com/problems/GERALD2)
37. Convex Hull : [Tutorial, Jarvis Algorithm Implementation](http://www.geeksforgeeks.org/convex-hull-set-1-jarviss-algorithm-or-wrapping/), [Tutorial with Graham scan](http://www.geeksforgeeks.org/convex-hull-set-2-graham-scan/), [Tutorial](http://help.topcoder.com/data-science/competing-in-algorithm-challenges/algorithm-tutorials/geometry-concepts-line-intersection-and-its-applications/), [Implementation](http://stanford.edu/~liszt90/acm/notebook.html#file8), [Problem](https://www.topcoder.com/stat?c=problem_statement&pm=3996&rd=7224), [Problem](http://codeforces.com/problemset/problem/166/B), [Problem](http://community.topcoder.com/stat?c=problem_statement&pm=1960&rd=4670), [Problem](http://acm.timus.ru/problem.aspx?num=1185&space=1), [Problem](http://www.spoj.com/problems/BSHEEP/)
38. Line Intersection : [Tutorial, Implementation](http://www.geeksforgeeks.org/check-if-two-given-line-segments-intersect/), [Tutorial, Problems](http://help.topcoder.com/data-science/competing-in-algorithm-challenges/algorithm-tutorials/geometry-concepts-line-intersection-and-its-applications/)
39. [Sieve of Erastothenes](http://www.geeksforgeeks.org/sieve-of-eratosthenes/)
40. Interval Tree : [Tutorial, Implementation](http://www.geeksforgeeks.org/interval-tree/), [Problem](http://www.codechef.com/problems/FLIPCOIN/), [Problem](http://www.spoj.com/problems/THRBL/), [Problem](http://www.spoj.com/problems/LITE/), [Problem](http://www.spoj.com/problems/FREQUENT/), [Problem](http://www.spoj.com/problems/GSS1/), [Problem](http://www.spoj.com/problems/GSS3/), [Tutorial](http://www.dgp.toronto.edu/people/JamesStewart/378notes/22intervals/)
41. [Counting Sort](http://www.geeksforgeeks.org/counting-sort/)
42. [Probabilities](http://help.topcoder.com/data-science/competing-in-algorithm-challenges/algorithm-tutorials/understanding-probabilities/)
43. Matrix Exponentiation : [Tutorial](http://discuss.codechef.com/questions/2335/building-up-the-recurrence-matrix-to-compute-recurrences-in-ologn-time), [Tutorial](http://zobayer.blogspot.in/2010/11/matrix-exponentiation.html)
44. Network flow : [(Max Flow)Tutorial : I,](http://help.topcoder.com/data-science/competing-in-algorithm-challenges/algorithm-tutorials/maximum-flow-section-1/) [II](http://community.topcoder.com/tc?d1=tutorials&d2=maxFlow2&module=Static), [Max Flow(Ford-Fulkerson) Tutorial, Implementation](http://www.geeksforgeeks.org/ford-fulkerson-algorithm-for-maximum-flow-problem/), [(Min Cut) Tutorial, Implementation](http://www.geeksforgeeks.org/minimum-cut-in-a-directed-graph/), [(Min Cost Flow)Tutorial : I,](http://community.topcoder.com/tc?d1=tutorials&d2=minimumCostFlow1&module=Static) [II,](http://help.topcoder.com/data-science/competing-in-algorithm-challenges/algorithm-tutorials/minimum-cost-flow-part-2-algorithms/) [III](http://help.topcoder.com/data-science/competing-in-algorithm-challenges/algorithm-tutorials/minimum-cost-flow-part-3-applications/), [Dinic's Algorithm with Implementation](http://e-maxx.ru/algo/dinic), [Max flow by Edmonds Karp with Implementation](http://e-maxx.ru/algo/edmonds_karp), [Problem](http://www.codechef.com/problems/TWOCOMP), [Problem](http://www.codechef.com/problems/LONGART), [Problem](http://www.codechef.com/problems/ANUBTT), [Problem](http://www.codechef.com/problems/ORDERAAM), [Problem](http://www.codechef.com/problems/PARADE), Problem, [Problem](http://www.codechef.com/problems/CAKE2AM), [Problem](http://www.spoj.com/problems/EN/), [Problem](http://www.spoj.com/problems/POTHOLE/), [Problem](http://www.spoj.com/problems/SCITIES/), [Problem](http://www.spoj.com/problems/GREED/), [Problem](http://www.spoj.com/problems/TOURS/), [Problem](http://community.topcoder.com/stat?c=problem_statement&pm=1931&rd=4709), [Problem](http://community.topcoder.com/stat?c=problem_statement&pm=2852&rd=5075), [Problem](http://community.topcoder.com/stat?c=problem_statement&pm=3530&rd=6535)
45. K-d tree : [Tutorial](http://web.stanford.edu/class/cs106l/handouts/assignment-3-kdtree.pdf), [Tutorial](http://www.autonlab.org/autonweb/14665/version/2/part/5/data/moore-tutorial.pdf?branch=main&language=en), [Implementation](http://rosettacode.org/wiki/K-d_tree), [Problem](http://www.spoj.com/problems/GANNHAT/)
46. [Deque](http://www.sourcetricks.com/2011/06/c-deque.html#.U--v__mSzfc)
47. Binary Search Tree : [Tutorial, Implementation](http://www.sourcetricks.com/2011/06/binary-search-trees-in-c.html#.U--wAvmSzfc), [Searching and Insertion](http://geeksquiz.com/binary-search-tree-set-1-search-and-insertion/), [Deletion](http://geeksquiz.com/binary-search-tree-set-2-delete/)
48. Quick Select : [Implementation](http://www.sourcetricks.com/2011/06/quick-select.html#.U_CQ0_mSzfc), [Implementation](http://rosettacode.org/wiki/Quickselect_algorithm#C.2B.2B)
49. Treap/Cartesian Tree : [Tutorial(detailed)](http://habrahabr.ru/post/101818/), [Tutorial, Implementation](http://e-maxx.ru/algo/treap), [Uses and Problems](http://codeforces.com/blog/entry/3767), [Problem](http://www.codechef.com/problems/CARDSHUF/), [Problem](http://www.codechef.com/problems/CHEFC)
50. Game Theory : [Detailed Paper](http://www.math.ucla.edu/~tom/Game_Theory/comb.pdf), [Tutorial, Problems](http://community.topcoder.com/tc?d1=tutorials&d2=algorithmGames&module=Static), [Grundy Numbers](http://letuskode.blogspot.ch/2014/08/grundy-numbers.html), [Tutorial with example problems - I,](http://www.thelearningpoint.net/home/mathematics/an-introduction-to-game-theory) [II,](http://www.thelearningpoint.net/home/mathematics/a-totorial-on-extensive-games-with-problems-and-solutions) [III,](http://www.thelearningpoint.net/home/mathematics/bayesian-games---games-with-incomplete-information)[IV](http://www.thelearningpoint.net/home/mathematics/repeated-games---tutorial-and-solved-problems), [Tutorial, Problems](http://www.codechef.com/wiki/tutorial-game-theory), [Problem](http://www.spoj.com/problems/NGM/), [Problem](http://www.spoj.com/problems/MCOINS/), [Problem](http://www.spoj.com/problems/QCJ3/), [Problem](http://www.spoj.com/problems/RESN04/), [Problem](http://www.spoj.com/problems/MMMGAME/), [Problem](http://www.spoj.com/problems/PEBBMOV/), [Problem](http://www.codechef.com/problems/CHEFBRO), [Problem](http://www.spoj.com/problems/HUBULLU/), [Problem](http://www.codechef.com/problems/BIGPIZA), [Problem](http://codeforces.com/contest/87/problem/C), [Problem](http://www.spoj.com/problems/CRSCNTRY/), [Nim](http://codeforces.com/blog/entry/3657)
51. STL (C++) : [I,](http://help.topcoder.com/data-science/competing-in-algorithm-challenges/algorithm-tutorials/power-up-c-with-the-standard-template-library-part-i/) [II](http://help.topcoder.com/data-science/competing-in-algorithm-challenges/algorithm-tutorials/power-up-c-with-the-standard-template-library-part-ii-advanced-uses/), [Crash Course](http://community.topcoder.com/tc?d1=features&d2=082803&module=Static)
52. [Maximum Bipartite Matching](http://www.geeksforgeeks.org/maximum-bipartite-matching/)
53. Manacher's Algorithm : [Implementation](http://leetcode.com/2011/11/longest-palindromic-substring-part-ii.html), [Tutorial](http://tarokuriyama.com/projects/palindrome2.php), [Tutorial, Implementation](http://tristan-interview.blogspot.in/2011/11/longest-palindrome-substring-manachers.html), [Tutorial, Implementation](http://e-maxx.ru/algo/palindromes_count), [Problem](http://acm.timus.ru/problem.aspx?num=1937&space=1), [Problem](http://www.spoj.com/problems/LPS/), [Problem](http://www.spoj.com/problems/MSUBSTR/)
54. [Miller-Rabin Primality Test](http://community.topcoder.com/tc?d1=tutorials&d2=primalityTesting&module=Static) : [Code](http://rosettacode.org/wiki/Miller-Rabin_primality_test#C)
55. [Stable Marriage Problem](http://www.geeksforgeeks.org/stable-marriage-problem/)
56. [Hungarian Algorithm](http://community.topcoder.com/tc?d1=tutorials&d2=hungarianAlgorithm&module=Static), [Tutorial](https://math.uc.edu/~halpern/Linear.progr.folder/Handouts.lp.02/Hungarian.algorithm.pdf)
57. [Sweep line Algorithm : I](https://www.topcoder.com/tc?d1=tutorials&d2=lineSweep&module=Static), [II](http://www.geeksforgeeks.org/given-a-set-of-line-segments-find-if-any-two-segments-intersect/)
58. LCP : [Tutorial, Implementation](http://codeforces.com/blog/entry/12796#comment-175287), [Tutorial, Implementation](http://e-maxx.ru/algo/suffix_array#7)
59. [Gaussian Elimination](http://compprog.wordpress.com/2007/12/11/gaussian-elimination/)
60. [Pollard Rho Integer Factorization](http://www.cs.colorado.edu/~srirams/classes/doku.php/pollard_rho_tutorial), [problem](http://www.spoj.com/problems/FACT1/)
61. [Topological Sorting](http://www.geeksforgeeks.org/topological-sorting/)
62. Detecting Cycles in a Graph : Directed - [I](http://www.geeksforgeeks.org/detect-cycle-in-a-graph/), [II](http://www.geeksforgeeks.org/union-find/) Undirected : [I](http://www.geeksforgeeks.org/detect-cycle-undirected-graph/)
63. Geometry : [Basics](http://help.topcoder.com/data-science/competing-in-algorithm-challenges/algorithm-tutorials/geometry-concepts-basic-concepts/), [Tutorial](http://web.stanford.edu/class/cs97si/09-computational-geometry.pdf)
64. Backtracking : [N queens problem](http://www.geeksforgeeks.org/backtracking-set-3-n-queen-problem/), [Tug of War](http://www.geeksforgeeks.org/tug-of-war/), [Sudoku](http://www.geeksforgeeks.org/backtracking-set-7-suduku/)
65. Eulerian and Hamiltonian Paths : [Tutorial](http://www.cs.sfu.ca/~ggbaker/zju/math/euler-ham.html#ham), [Tutorial](http://www.csd.uoc.gr/~hy583/papers/ch14.pdf), [(Eulerian Path and Cycle)Implementation](http://www.geeksforgeeks.org/eulerian-path-and-circuit/), [(Hamiltonian Cycle)Implementation](http://www.geeksforgeeks.org/backtracking-set-7-hamiltonian-cycle/)
66. Graph Coloring : [Tutorial, Implementation](http://algorithm.daqwest.com/search?search=Coloring+algorithm)
67. Meet in the Middle : [Tutorial](http://www.infoarena.ro/blog/meet-in-the-middle), [Implementation](https://sites.google.com/site/indy256/algo/meet-in-the-middle)
68. [Arbitrary Precision Integer(BigInt)](http://pastebin.com/aQ8NJ197), [II](https://github.com/anudeep2011/programming/blob/master/bigint.cpp)
69. [Radix Sort](http://www.geeksforgeeks.org/radix-sort/), [Bucket Sort](http://www.geeksforgeeks.org/bucket-sort-2/)
70. Johnson's Algorithm : [Tutorial](http://www.geeksforgeeks.org/johnsons-algorithm/), [Tutorial](http://en.wikipedia.org/wiki/Johnson's_algorithm), [Implementation](https://gist.github.com/ashleyholman/6793360)
71. Maximal Matching in a General Graph : [Blossom/Edmond's Algorithm, Implementation](http://e-maxx.ru/algo/matching_edmonds), [Tutte Matrix](http://e-maxx.ru/algo/tutte_matrix), [Problem](http://www.codechef.com/problems/SEAGRP)
72. Recursion : [I,](http://community.topcoder.com/tc?d1=tutorials&d2=recursionPt1&module=Static) [II](http://community.topcoder.com/tc?d1=tutorials&d2=recursionPt2&module=Static), [Towers of Hanoi](http://geeksquiz.com/c-program-for-tower-of-hanoi/) with [explanation](http://en.wikipedia.org/wiki/Tower_of_Hanoi#Recursive_solution)
73. [Inclusion and Exclusion Principle : I](http://apps.topcoder.com/forums/?module=Thread&start=0&threadID=685138), [II](http://e-maxx.ru/algo/inclusion_exclusion_principle)
74. [Co-ordinate Compression](https://www.quora.com/What-is-coordinate-compression-and-what-is-it-used-for)
75. Sqrt-Decomposition : [Tutorial](http://e-maxx.ru/algo/sqrt_decomposition), [Tutorial](http://sysmagazine.com/posts/138946/), [Problem](http://www.spoj.com/problems/RACETIME/), [Problem](http://www.codechef.com/problems/GERALD07)
76. Link-Cut Tree : [Tutorial](http://www.cs.cmu.edu/~sleator/papers/dynamic-trees.pdf), [Wiki](http://en.wikipedia.org/wiki/Link/cut_tree), [Tutorial, Implementation](http://www.cs.cmu.edu/~avrim/451f12/lectures/lect1009-linkcut.txt), [Problem](http://www.codechef.com/problems/QTREE6), [Problem](http://www.spoj.com/problems/DYNACON1/), [Problem](http://www.spoj.com/problems/DYNALCA/), [Problem](http://codeforces.com/contest/117/problem/E)
77. Euler's Totient Function : [Explanation, Implementation, Problems](http://e-maxx.ru/algo/euler_function), [Explanation, Problems](http://community.topcoder.com/tc?d1=tutorials&d2=primeNumbers&module=Static)
78. Burnside Lemma : [Tutorial](http://e-maxx.ru/algo/burnside_polya), [Tutorial](http://petr-mitrichev.blogspot.in/2008/11/burnsides-lemma.html), [Problem](http://community.topcoder.com/stat?c=problem_statement&pm=9975)
79. Edit/Levenshtein Distance : [Tutorial](https://web.stanford.edu/class/cs124/lec/med.pdf), [Introduction](http://en.wikipedia.org/wiki/Wagner%E2%80%93Fischer_algorithm), [Tutorial](http://www.csse.monash.edu.au/~lloyd/tildeAlgDS/Dynamic/Edit/), [Problem](http://www.codechef.com/problems/SEATSR), [Problem](http://www.spoj.com/problems/EDIST/)
80. [Branch and Bound](http://www.academic.marist.edu/~jzbv/algorithms/Branch%20and%20Bound.htm)
81. [Math for Competitive Programming](http://community.topcoder.com/tc?d1=tutorials&d2=math_for_topcoders&module=Static)
82. Mo's Algorithm : [Tutorial and Problems](http://blog.anudeep2011.com/mos-algorithm/)

source: [Data Structures and Algorithms](https://discuss.codechef.com/questions/48877/data-structures-and-algorithms)