

## Algorithm and programming Technique list (with relative links)

### **Mathematics:**

- [http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=math\\_for\\_topcoders](http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=math_for_topcoders)
- ❖ Sieve of Eratosthenes (prime finding)
  - [http://en.wikipedia.org/wiki/Sieve\\_of\\_Eratosthenes](http://en.wikipedia.org/wiki/Sieve_of_Eratosthenes)
  - <http://www.shafaetsplanet.com/planetcoding/?p=624>
  - [http://translate.googleusercontent.com/translate\\_c?act=url&depth=1&hl=en&ie=UTF8&prev=\\_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/eratosthenes\\_sieve&usg=ALkJrhhwtnMHMOYCdg4BxIfMFpyTHN-\\_pA](http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/eratosthenes_sieve&usg=ALkJrhhwtnMHMOYCdg4BxIfMFpyTHN-_pA)
- ❖ Bitwise Sieve
  - <http://www.shafaetsplanet.com/planetcoding/?p=855>
- ❖ Segmented Sieve
  - <http://zobayer.blogspot.com/2009/09/segmented-sieve.html>
- ❖ prime factorization
  - <https://www.dropbox.com/s/ndai0fquchmazu7/factorization.pdf> (pdf by jan vai)
  - <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=primeNumbers>
  - <http://zobayer.blogspot.com/2013/02/divisor-function.html>
- ❖ GCD, LCM
- ❖ Factorial
  - <http://alavolacoder.blogspot.com/2013/04/factorial-facts.html>
  - [http://alavolacoder.blogspot.com/2013/04/factorial-facts\\_9.html](http://alavolacoder.blogspot.com/2013/04/factorial-facts_9.html)
  - <http://zobayer.blogspot.com/2009/07/factorial.html>
- ❖ Fibonacci
- ❖ Counting, Permutation, combination
  - <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=combinatorics>
- ❖ Exponentiation
- ❖ Modular Arithmetic
  - <http://www.shafaetsplanet.com/planetcoding/?p=936>
- ❖ Euclid, Extended euclid
  - <http://zobayer.blogspot.com/2009/07/extended-euclidean-algorithm.html>
  - [http://translate.googleusercontent.com/translate\\_c?act=url&depth=1&hl=en&ie=UTF8&prev=\\_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/euclid\\_algorithm&usg=ALkJrhkhkz3tb4aXWHeD8eIJvJCQhe-jn7Q](http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/euclid_algorithm&usg=ALkJrhkhkz3tb4aXWHeD8eIJvJCQhe-jn7Q)
  - [http://translate.googleusercontent.com/translate\\_c?act=url&depth=1&hl=en&ie=UTF8&pr](http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&pr)

[ev=\\_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/extended\\_euclid\\_algorithm&usg=ALkJrhggyM7s9peFmIRPQqhXdBGE9-CeHw](http://e-maxx.ru/algo/extended_euclid_algorithm&usg=ALkJrhggyM7s9peFmIRPQqhXdBGE9-CeHw)

## **Data Structure:**

- <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=dataStructures>
- ❖ Stack
  - <http://alavolacoder.blogspot.com/2013/02/stack.html>
- ❖ Queue
  - <http://alavolacoder.blogspot.com/2013/03/queue.html>
- ❖ Priority Queue
- ❖ Linked list
  - [http://alavolacoder.blogspot.com/2013/02/blog-post\\_19.html](http://alavolacoder.blogspot.com/2013/02/blog-post_19.html)
  - [http://alavolacoder.blogspot.com/2013/02/blog-post\\_24.html](http://alavolacoder.blogspot.com/2013/02/blog-post_24.html)
  - <http://zobayer.blogspot.com/2009/12/cse-102-linked-list-in-c.html>
- ❖ Heap
- ❖ Hash table
- ❖ Disjoint Set, Union Find
  - <http://www.shafaetsplanet.com/planetcoding/?p=763>
  - <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=disjointDataStructure>
- ❖ Binary Search Tree
  - <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/binarySearchTree.htm>
- ❖ Trie, Suffix Array
  - <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=usingTries>
- ❖ Binary Indexed Tree(BIT)
  - <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=binaryIndexedTrees>
- ❖ Segmented Tree
  - <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=lowestCommonAncestor>
  - <http://www.shafaetsplanet.com/planetcoding/?p=1557>
  - <http://www.shafaetsplanet.com/planetcoding/?p=1591>
- ❖ Heavy Light decomposition
  - [http://wcipeg.com/wiki/Heavy-light\\_decomposition](http://wcipeg.com/wiki/Heavy-light_decomposition)

- [http://translate.googleusercontent.com/translate\\_c?act=url&depth=1&hl=en&ie=UTF8&prev=\\_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/heavy\\_light&usg=ALkJrhjj3RdDbiiCaQoThkAzVfSqnJuJkA](http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/heavy_light&usg=ALkJrhjj3RdDbiiCaQoThkAzVfSqnJuJkA)

## **Sorting:**

- <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=sorting>
- [http://bongobani.blogspot.com/2010/06/blog-post\\_1625.html](http://bongobani.blogspot.com/2010/06/blog-post_1625.html)
- ❖ Bubble Sort
  - <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Sorting/bubbleSort.htm>
- ❖ Selection Sort
  - <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Sorting/selectionSort.htm>
- ❖ Insertion Sort
  - <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Sorting/insertionSort.htm>
- ❖ Shell Sort
  - <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Sorting/shellSort.htm>
- ❖ Quick Sort
  - <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Sorting/quickSort.htm>
- ❖ Merge Sort
  - <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Sorting/mergeSort.htm>
  - <http://zobayer.blogspot.com/2010/08/merge-sort.html>
  - <http://zobayer.blogspot.com/2010/09/threaded-merge-sort.html>
  - <http://zobayer.blogspot.com/2010/11/merge-sort-improvement.html>
- ❖ Counting Sort
  - <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Sorting/countingSort.htm>
- ❖ Radix Sort
  - <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Sorting/radixSort.htm>

[m](#)

- ❖ Bucket Sort

- <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Sorting/bucketSort.htm>

- ❖ Heap Sort

- <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Sorting/heapSort.htm>

### **Searching:**

- ❖ Linear Search

- ❖ Binary Search

- <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=binarySearch>

- ❖ Ternary Search

- [http://translate.googleusercontent.com/translate\\_c?act=url&depth=1&hl=en&ie=UTF8&prev=\\_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/ternary\\_search&usq=ALkJrhgQ1I9JBNisS1NAVe5CcgYxCRhqtA](http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/ternary_search&usq=ALkJrhgQ1I9JBNisS1NAVe5CcgYxCRhqtA)

- ❖ Map, HashMap

### **Dynamic Programming:**

- [https://sites.google.com/site/smilitude/recursion\\_and\\_dp](https://sites.google.com/site/smilitude/recursion_and_dp)
  - <http://www.codechef.com/wiki/tutorial-dynamic-programming>
  - <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=dynProg>
  - <http://www.shafaetsplanet.com/planetcoding/?p=1022>
  - <http://www.shafaetsplanet.com/planetcoding/?p=1211>

- ❖ Rod Cutting

- ❖ Maximum Sum (1D, 2D)

- ❖ Coin Change

- <http://www.shafaetsplanet.com/planetcoding/?p=1158>
  - <https://sites.google.com/site/programinggconcept/algorithm>

- ❖ Longest Common Subsequence

- ❖ Longest Increasing subsequence, Longest Decreasing Subsequence

- ❖ Calculating  $nCr$  using DP
  - <http://zobayer.blogspot.com/2009/08/calculate-ncr-using-dp.html>
- ❖ Matrix Chain multiplication
  - <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Dynamic/chainMatrixMult.htm>
- ❖ Edit Distance
- ❖ 0-1 Knapsack
  - <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Greedy/knapsackIO.htm>
  - <http://www.shafaetsplanet.com/planetcoding/?p=1072>
  - <https://sites.google.com/site/programmingconcept/0-1-knapsack>
- ❖ Bitmask DP
  - <http://www.shafaetsplanet.com/planetcoding/?p=1357>
- ❖ Traveling Salesman problem
  - <http://www.shafaetsplanet.com/planetcoding/?p=571>
  - <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/AproxAlgor/TSP/tsp.htm>
- ❖ Digit DP
  - <http://codeforces.com/blog/entry/7221>

### **Greedy algorithm:**

- <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=greedyAlg>
- ❖ Activity selection/Task scheduling problem
  - <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Greedy/activity.htm>
- ❖ Huffman coding
  - <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Greedy/huffman.htm>
  - <http://zobayer.blogspot.com/2011/01/huffmans-code.html>
- ❖ Fractional knapsack problem
  - <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Greedy/knapsackFractional.htm>

### **Graph Theory:**

- <https://sites.google.com/site/smilitude/shortestpath>
- [https://sites.google.com/site/smilitude/shortestpath\\_problems](https://sites.google.com/site/smilitude/shortestpath_problems)
- <http://www.codechef.com/wiki/tutorial-graph-theory-part-1>
- <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=graphsDataStrucs1>
- <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=graphsDataStrucs2>
- <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=graphsDataStrucs3>
- ❖ Graph Representation(matrix, list/vector)
  - <http://www.shafaetsplanet.com/planetcoding/?p=143>
  - <http://www.shafaetsplanet.com/planetcoding/?p=184>
  - <http://www.shafaetsplanet.com/planetcoding/?p=211>
- ❖ Breadth First Search(BFS)
  - <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/GraphAlgor/breadthSearch.htm>
  - <http://www.shafaetsplanet.com/planetcoding/?p=604>
  - <http://www.shafaetsplanet.com/planetcoding/?p=639>
  - [http://translate.googleusercontent.com/translate\\_c?act=url&depth=1&hl=en&ie=UTF8&prev=\\_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/bfs&usq=ALkJrhinv0P87U0v\\_VXJhm3L6aGS5KEuPA](http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/bfs&usq=ALkJrhinv0P87U0v_VXJhm3L6aGS5KEuPA)
- ❖ Depth First Search(DFS)
  - <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/GraphAlgor/depthSearch.htm>
  - <http://www.shafaetsplanet.com/planetcoding/?p=973>
  - [http://translate.googleusercontent.com/translate\\_c?act=url&depth=1&hl=en&ie=UTF8&prev=\\_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/dfs&usq=ALkJrhiWHq30PgqeB1q11ZSAJrvMeOJksw](http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/dfs&usq=ALkJrhiWHq30PgqeB1q11ZSAJrvMeOJksw)
- ❖ Bipartite Graph checking
  - <http://zobayer.blogspot.com/2010/03/testing-bipartite-graph.html>
- ❖ Topological Sort
  - <https://sites.google.com/site/smilitude/topsort>
  - <http://www.shafaetsplanet.com/planetcoding/?p=848>
  - <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/GraphAlgor/topoSort.htm>
  - [http://translate.googleusercontent.com/translate\\_c?act=url&depth=1&hl=en&ie=UTF8&prev=\\_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/topoSort&usq=ALkJrhinv0P87U0v\\_VXJhm3L6aGS5KEuPA](http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/topoSort&usq=ALkJrhinv0P87U0v_VXJhm3L6aGS5KEuPA)

[ev=\\_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/topological\\_sort&usg=ALkJrhAS83fGpkoZIfziKQZIpYQy4JZ9A](http://e-maxx.ru/algo/topological_sort&usg=ALkJrhAS83fGpkoZIfziKQZIpYQy4JZ9A)

❖ Strongly Connected Component(SCC)

- <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/GraphAlgor/strongComponent.htm>
- [http://translate.googleusercontent.com/translate\\_c?act=url&depth=1&hl=en&ie=UTF8&prev=\\_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/strong\\_connected\\_components&usg=ALkJrhip3cmRxf-Uk\\_1COz-PHg57GuwEGg](http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/strong_connected_components&usg=ALkJrhip3cmRxf-Uk_1COz-PHg57GuwEGg)

❖ Minimum Spanning Tree(MST)

- Kruskal's Algorithm
  - <http://www.shafaetsplanet.com/planetcoding/?p=692>
  - <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/GraphAlgor/kruskalAlgor.htm>
  - <http://zobayer.blogspot.com/2010/01/kruskals-algorithm-in-c.html>
- Prim's Algorithm
  - <http://www.shafaetsplanet.com/planetcoding/?p=825>
  - <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/GraphAlgor/primAlgor.htm>
  - [http://www.graph-magics.com/articles/min\\_spantree.php](http://www.graph-magics.com/articles/min_spantree.php)
- Directed MST
  - <http://www.ce.rit.edu/~sjyeec/dmst.html>

❖ All pair's shortest path(Floyd Warshall)

- [http://www.graph-magics.com/articles/all\\_shortest\\_paths.php](http://www.graph-magics.com/articles/all_shortest_paths.php)
- [http://translate.googleusercontent.com/translate\\_c?act=url&depth=1&hl=en&ie=UTF8&prev=\\_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/floyd\\_warshall\\_algorithm&usg=ALkJrhgoQbn-45TnSyPYBa0T2o\\_\\_DDuJSw](http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/floyd_warshall_algorithm&usg=ALkJrhgoQbn-45TnSyPYBa0T2o__DDuJSw)

❖ Dijkstra algorithm

- <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/GraphAlgor/dijkstraAlgor.htm>
- <http://www.shafaetsplanet.com/planetcoding/?p=1500>
- <http://zobayer.blogspot.com/2009/12/dijkstras-algorithm-in-c.html>

❖ Bellman Ford Algorithm

- <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/GraphAlgor/bellFord>

## [Algor.htm](#)

- ❖ Directed Acyclic Graph
- ❖ Bipartite Matching
  - <http://zobayer.blogspot.com/2010/05/maximum-matching-with-dfs.html>
  - <http://zobayer.blogspot.com/2010/05/maximum-matching.html>
- ❖ Max-Flow, Min-cost max-flow
  - <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=maxFlowRevisited>
- ❖ Cayley's Theorem
- ❖ Articulation Point
  - [http://translate.googleusercontent.com/translate\\_c?act=url&depth=1&hl=en&ie=UTF8&prev=\\_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/cutpoints&usg=ALkJrhiSuFiBqY\\_EBgCC68vfrvW2o5vZnA](http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/cutpoints&usg=ALkJrhiSuFiBqY_EBgCC68vfrvW2o5vZnA)
- ❖ Bridge
  - [http://translate.googleusercontent.com/translate\\_c?act=url&depth=1&hl=en&ie=UTF8&prev=\\_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/bridge\\_searching&usg=ALkJrhjv4XdY8Jh7vYLV0UbVsClgscwhWg](http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/bridge_searching&usg=ALkJrhjv4XdY8Jh7vYLV0UbVsClgscwhWg)
- ❖ Euler tour/path
  - <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/GraphAlgor/eulerTour.htm>
  - <http://zobayer.blogspot.com/2010/06/euler-tour.html>
  - <http://www.graph-magics.com/articles/euler.php>
  - [http://translate.googleusercontent.com/translate\\_c?act=url&depth=1&hl=en&ie=UTF8&prev=\\_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/euler\\_path&usg=ALkJrhfhfu-QYqtQCLEclXxB-nQ1lbebqvw](http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/euler_path&usg=ALkJrhfhfu-QYqtQCLEclXxB-nQ1lbebqvw)
- ❖ Hamiltonian Cycle
- ❖ Stable Marriage problem
  - <http://www.shafaetsplanet.com/planetcoding/?p=1187>
- ❖ Chinese Postman problem
- ❖ Minimum Vertex Cover(Graph+DP)
  - <http://www.shafaetsplanet.com/planetcoding/?p=582>
  - <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/AproxAlgor/vertexCover.htm>



## **Number Theory:**

### ❖ Josephus Problem

- [http://en.wikipedia.org/wiki/Josephus\\_problem](http://en.wikipedia.org/wiki/Josephus_problem)
- <http://www.cut-the-knot.org/recurrence/flavius.shtml>
- [http://translate.googleusercontent.com/translate\\_c?act=url&depth=1&hl=en&ie=UTF8&prev=\\_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/joseph\\_problem&usg=ALkJrhgMHDKM8tt5il-GjN79rqFrWqWtFg](http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/joseph_problem&usg=ALkJrhgMHDKM8tt5il-GjN79rqFrWqWtFg)

### ❖ Farey Sequence, Stern-brocot Tree

- [http://translate.googleusercontent.com/translate\\_c?act=url&depth=1&hl=en&ie=UTF8&prev=\\_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/stern\\_brocot\\_farey&usg=ALkJrhgnF7douyHovchr9Cid9vqFp4yuZw](http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/stern_brocot_farey&usg=ALkJrhgnF7douyHovchr9Cid9vqFp4yuZw)

### ❖ Catalan numbers

- [http://en.wikipedia.org/wiki/Catalan\\_number](http://en.wikipedia.org/wiki/Catalan_number)
- [http://translate.googleusercontent.com/translate\\_c?act=url&depth=1&hl=en&ie=UTF8&prev=\\_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/catalan\\_numbers&usg=ALkJrhhRH\\_RJQQbF1YaUhncPRILVkzJQYw](http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/catalan_numbers&usg=ALkJrhhRH_RJQQbF1YaUhncPRILVkzJQYw)

### ❖ Euler's phi

- <http://zobayer.blogspot.com/2013/02/euler-totient-function.html>
- [http://translate.googleusercontent.com/translate\\_c?act=url&depth=1&hl=en&ie=UTF8&prev=\\_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/euler\\_function&usg=ALkJrhidn-VzTqkKA2YBticLAs-ZDj\\_LKg](http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/euler_function&usg=ALkJrhidn-VzTqkKA2YBticLAs-ZDj_LKg)

### ❖ Burnside's lemma/circular permutation

- [http://translate.googleusercontent.com/translate\\_c?act=url&depth=1&hl=en&ie=UTF8&prev=\\_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/burnside\\_polya&usg=ALkJrhhc0pVhgwbXKi01y2l8Ve8lOiSlxg](http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/burnside_polya&usg=ALkJrhhc0pVhgwbXKi01y2l8Ve8lOiSlxg)

### ❖ Modular inverse

- <https://www.facebook.com/notes/emtiaj-hasan/%E0%A6%AE%E0%A6%A1-%E0%A6%A8%E0%A6%BF%E0%A7%9F%E0%A7%87-%E0%A6%AE%E0%A6%A1%E0%A6%B0-%E0%A6%AE%E0%A6%A1%E0%A6%B0-%E0%A6%87%E0%A6%A8%E0%A6%AD%E0%A6%BE%E0%A6%B0%E0%A7%8D%E0%A6%B8-%E0%A6%AE%E0%A6%A1%E0%A7%87%E0%A6%B0-%E0%A6%B8%E0%A6%BE%E0%A6%A5%E0%A7%87-%E0%A6%B8%E0%A6%BF-%E0%A6%86%E0%A6%B0-%E0%A6%9F%E0%A6%BF-%E0%A6%B0-%E0%A6%95%E0%A6%9A%E0%A6%95%E0%A6%9A%E0%A6%BE%E0>

[A6%A8%E0%A6%BF/448341041903611](http://A6%A8%E0%A6%BF/448341041903611)

- ❖ Probability
  - <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=probabilities>
- ❖ Chinese Remainder Theorem
  - [http://translate.googleusercontent.com/translate\\_c?act=url&depth=1&hl=en&ie=UTF8&prev=\\_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/chinese\\_theorem&usg=ALkJrhhib5yTDIZ1VJE7vt1YuEMWyuOm0A](http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/chinese_theorem&usg=ALkJrhhib5yTDIZ1VJE7vt1YuEMWyuOm0A)
- ❖ Gaussian Elimination method
  - <http://zobayer.blogspot.com/2009/12/gaussjordan-elimination.html>
- ❖ Dilworth's Theorem
- ❖ Matrix Exponentiation
  - <http://zobayer.blogspot.com/2010/11/matrix-exponentiation.html>
- ❖ Determinant of a matrix
- ❖ RSA public key crypto System

### **Computation Geometry:**

- <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=geometry1>
- <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=geometry2>
- <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=geometry3>
- <http://www.personal.kent.edu/~rmuhamma/Compgeometry/compgeom.html>
- ❖ Pick's Theorem
- ❖ Convex hull
  - <http://zobayer.blogspot.com/2010/02/convex-hull.html>
- ❖ Line Intersection
- ❖ Segment circle intersection
  - <http://zobayer.blogspot.com/2009/11/geometry-segment-circle-intersection.html>
- ❖ Point in a polygon
- ❖ Area of a polygon
- ❖ Line Sweeping
  - <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=lineSweep>
- ❖ Polygon intersection
- ❖ Closest Pair

### **Game Theory:**

- <http://potasiyam.com/farsan/>
- ❖ Take Away game
  - <http://zobayer.blogspot.com/2010/08/simple-take-away-game.html>
- ❖ Nim
- ❖ Sprague-grundy Number

### **String:**

- <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=stringSearching>
- <http://doinik-iut.com/archives/23106>
- ❖ Naive String matching
  - <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/StringMatch/naiveStringMatch.htm>
- ❖ Rabin karp Algo
  - <http://www.infoarena.ro/blog/rolling-hash>
- ❖ Finite Automata
- ❖ Knuth-Morris-Pratt Algo
  - <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/StringMatch/kuthMP.htm>
- ❖ Manacher's Algo
- ❖ Aho korasick's Algo
- ❖ Boyer-Moore Algorithm
  - <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/StringMatch/boyerMoore.htm>

### **Others:**

- ❖ Recursion
  - <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=recursionPt1>
  - <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=recursionPt2>
  - <http://zobayer.blogspot.com/2009/12/cse-102-attacking-recursion.html>
  - <http://zobayer.blogspot.com/2009/12/cse-102-practice-recursions.html>
- ❖ Backtracking
  - <http://www.shafaetsplanet.com/planetcoding/?p=1266>

- <http://www.academic.marist.edu/~jzbv/algorithms/Backtracking.htm>
- ❖ Hungarian Algorithm
  - <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=hungarianAlgorithm>
- ❖ C++ STL(Standard Template Library)
  - <https://sites.google.com/site/smilitude/cpp>
  - <https://sites.google.com/site/smilitude/stl>
  - <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=standardTemplateLibrary>
  - <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=standardTemplateLibrary2>
- ❖ Bitwise operations
  - <http://www.codechef.com/wiki/tutorial-bitwise-operations>
  - <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=bitManipulation>
  - <http://zobayer.blogspot.com/2009/12/bitwise-operations-in-cc-part-1.html>
  - <http://zobayer.blogspot.com/2009/12/bitwise-operations-in-c-part-2.html>
  - <http://zobayer.blogspot.com/2009/12/bitwise-operations-in-c-part-3.html>