Topics

1. Analysis of Algorithms
2. Searching and Sorting
3. Greedy Algorithms
4. Dynamic Programming
5. Pattern Searching
6. Other String Algorithms
7. Backtracking
8. Divide and Conquer
9. Geometric Algorithms
10. Mathematical Algorithms
11. Bit Algorithms
12. Graph Algorithms
13. Randomized Algorithms
14. Quizzes on Algorithms
15. Misc

Analysis of Algorithms:

1 1 Asymptotic Analysis
2 2 Worst, Average and Best Cases
3 3 Asymptotic Notations
4 4 Analysis of Loops
5 5 Solving Recurrences
6 6 Amortized Analysis
7 7 What does 'Space Complexity' mean?
8 8 NP-Completeness Introduction
9 9 A Time Complexity Question
10 10 Time Complexity of building a heap

Quiz on Analysis of Algorithms

Quiz on Recurrences

Searching and Sorting:

10 1 Binary Search
11 2 Selection Sort
12 3 Bubble Sort
13 4 Insertion Sort
14 5 Merge Sort
15 6 Heap Sort
16 7 QuickSort
17 8 Bucket Sort
18 9 ShellSort
19 10 Interpolation search vs Binary search
20 11 Stability in sorting algorithms

12. When does the worst case of Quicksort occur?
13. Lower bound for comparison based sorting algorithms
14. Which sorting algorithm makes minimum number of memory writes?
15. Find the Minimum length Unsorted Subarray, sorting which makes the complete array sort
16. Merge Sort for Linked Lists
17. Sort a nearly sorted (or K sorted) array
18. Iterative Quick Sort
19. QuickSort on Singly Linked List
20. QuickSort on Doubly Linked List
21. Find k closest elements to a given value
22. Sort n numbers in range from 0 to n^2 – 1 in linear time
23. A Problem in Many Binary Search Implementations
24. Search in an almost sorted array
25. Sort an array in wave form
26. Why is Binary Search preferred over Ternary Search?
27. K'th Smallest/Largest Element in Unsorted Array
28. K'th Smallest/Largest Element in Unsorted Array in Expected Linear Time
29. K'th Smallest/Largest Element in Unsorted Array in Worst Case Linear Time
30. Find the closest pair from two sorted arrays
31. Find common elements in three sorted arrays
32. Given a sorted array and a number x, find the pair in array whose sum is closest to x
33. Count 1's in a sorted binary array
34. Binary Insertion Sort
35. Insertion Sort for Singly Linked List
36. Why Quick Sort preferred for Arrays and Merge Sort for Linked Lists?
37. Merge Sort for Doubly Linked List

Quiz on Sorting

Quiz on Searching

Greedy Algorithms:

1. Activity Selection Problem
2. Kruskal's Minimum Spanning Tree Algorithm
3. Huffman Coding
4. Efficient Huffman Coding for Sorted Input
5. Prim's Minimum Spanning Tree Algorithm
6. Prim's MST for Adjacency List Representation
7. Dijkstra's Shortest Path Algorithm
8. Dijkstra's Algorithm for Adjacency List Representation
9. Job Sequencing Problem
10. Quiz on Greedy Algorithms
11. K Centers Problem

Dynamic Programming:

1. Overlapping Subproblems Property
2. Optimal Substructure Property
3. Longest Increasing Subsequence
4. Longest Common Subsequence
5. Edit Distance
6. Min Cost Path
7. Coin Change
8. Matrix Chain Multiplication
9. Binomial Coefficient
10. 0-1 Knapsack Problem
11. Egg Dropping Puzzle
12. Longest Palindromic Subsequence
13. Cutting a Rod
14. Maximum Sum Increasing Subsequence
15. Longest Bitonic Subsequence
16. Floyd Warshall Algorithm
17. Palindrome Partitioning
18. Partition problem
19. Word Wrap Problem
20. Maximum Length Chain of Pairs
21. Variations of LIS
22. Box Stacking Problem
23. Program for Fibonacci numbers
24. Minimum number of jumps to reach end
25. Maximum size square sub-matrix with all 1s
26. Ugly Numbers
27. Largest Sum Contiguous Subarray
28. Longest Palindromic Substring
29. Bellman–Ford Algorithm for Shortest Paths
30. Optimal Binary Search Tree
31. Largest Independent Set Problem
32. Subset Sum Problem
33. Maximum sum rectangle in a 2D matrix
34. Count number of binary strings without consecutive 1?s
35. Boolean Parenthesization Problem
36. Count ways to reach the n'th stair
37. Minimum Cost Polygon Triangulation
38. Mobile Numeric Keypad Problem

See Dynamic Programming Tag for more problems, Quiz on Dynamic Programming

Pattern Searching:

1. Naive Pattern Searching
2. KMP Algorithm
3. Rabin-Karp Algorithm
4. A Naive Pattern Searching Question

100 5 Finite Automata
101 6 Efficient Construction of Finite Automata
102 7 Boyer Moore Algorithm – Bad Character Heuristic
103 8 Suffix Array
104 9 Anagram Substring Search (Or Search for all permutations)
105 10 Pattern Searching using a Trie of all Suffixes

Other String Algorithms:

106 1 Manacher's Algorithm – Linear Time Longest Palindromic Substring – Part 1, Part 2, Part 3,
107 2 Longest Even Length Substring such that Sum of First and Second Half is same
108 3 Print all possible strings that can be made by placing spaces

Backtracking:

109 1 Print all permutations of a given string
110 2 The Knight's tour problem
111 3 Rat in a Maze
112 4 N Queen Problem
113 5 Subset Sum
114 6 m Coloring Problem
115 7 Hamiltonian Cycle
116 8 Sudoku
117 9 Tug of War
118 10 Solving Cryptarithmetic Puzzles

Divide and Conquer:

119 1 Introduction
120 2 Write your own pow(x, n) to calculate x*n
121 3 Median of two sorted arrays
122 4 Count Inversions
123 5 Closest Pair of Points
124 6 Strassen's Matrix Multiplication

See this for more, Quiz on Divide and Conquer

Geometric Algorithms:

125 1 Closest Pair of Points | O(nlogn) Implementation
126 2 How to check if two given line segments intersect?
127 3 How to check if a given point lies inside or outside a polygon?
128 4 Convex Hull | Set 1 (Jarvis's Algorithm or Wrapping)
129 5 Convex Hull | Set 2 (Graham Scan)
130 6 Given n line segments, find if any two segments intersect
131 7 Check whether a given point lies inside a triangle or not
132 8 How to check if given four points form a square

Mathematical Algorithms:

1. Write an Efficient Method to Check if a Number is Multiple of 3
2. Efficient way to multiply with 7
3. Write a C program to print all permutations of a given string
4. Lucky Numbers
5. Write a program to add two numbers in base 14
6. Babylonian method for square root
7. Multiply two integers without using multiplication, division and bitwise operators, and no
8. Print all combinations of points that can compose a given number
9. Write you own Power without using multiplication(*) and division(/) operators
10. Program for Fibonacci numbers
11. Average of a stream of numbers
12. Count numbers that don't contain 3
13. MagicSquare
14. Sieve of Eratosthenes
15. Find day of the week for a given date
16. DFA based division
17. Generate integer from 1 to 7 with equal probability
18. Given a number, find the next smallest palindrome
19. Make a fair coin from a biased coin
20. Check divisibility by 7
21. Find the largest multiple of 3
22. Lexicographic rank of a string
23. Print all permutations in sorted (lexicographic) order
24. Shuffle a given array
25. Space and time efficient Binomial Coefficient
26. Reservoir Sampling
27. Pascal's Triangle
28. Select a random number from stream, with O(1) space
29. Find the largest multiple of 2, 3 and 5
30. Efficient program to calculate e^x
31. Measure one litre using two vessels and infinite water supply
32. Efficient program to print all prime factors of a given number
33. Print all possible combinations of r elements in a given array of size n
34. Random number generator in arbitrary probability distribution fashion
35. How to check if a given number is Fibonacci number?
36. Russian Peasant Multiplication
37. Count all possible groups of size 2 or 3 that have sum as multiple of 3
38. Tower of Hanoi
39. Horner's Method for Polynomial Evaluation
40. Count trailing zeroes in factorial of a number
41. Program for nth Catalan Number
42. Generate one of 3 numbers according to given probabilities
43. Find Excel column name from a given column number
44. Find next greater number with same set of digits

177 45 Count Possible Decodings of a given Digit Sequence
178 46 Calculate the angle between hour hand and minute hand
179 47 Count number of binary strings without consecutive 1?s
180 48 Find the smallest number whose digits multiply to a given number n
181 49 Draw a circle without floating point arithmetic
182 50 How to check if an instance of 8 puzzle is solvable?
183 51 Birthday Paradox
184 52 Multiply two polynomials
185 53 Count Distinct Non-Negative Integer Pairs (x, y) that Satisfy the Inequality x*x + y*y < n
186 54 Count ways to reach the n'th stair
187 55 Replace all '0' with '5' in an input Integer
188 56 Program to add two polynomials
189 57 Print first k digits of 1/n where n is a positive integer
190 58 Given a number as a string, find the number of contiguous subsequences which recursively

Bit Algorithms:

191 1 Find the element that appears once
192 2 Detect opposite signs
193 3 Set bits in all numbers from 1 to n
194 4 Swap bits
195 5 Add two numbers
196 6 Smallest of three
197 7 A Boolean Array Puzzle
198 8 Set bits in an (big) array
199 9 Next higher number with same number of set bits
200 10 Optimization Technique (Modulus)
201 11 Add 1 to a number
202 12 Multiply with 3.5
203 13 Turn off the rightmost set bit
204 14 Check for Power of 4
205 15 Absolute value (abs) without branching
206 16 Modulus division by a power-of-2-number
207 17 Minimum or Maximum of two integers
208 18 Rotate bits
209 19 Find the two non-repeating elements in an array
210 20 Number Occurring Odd Number of Times
211 21 Check for Integer Overflow
212 22 Little and Big Endian
213 23 Reverse Bits of a Number
214 24 Count set bits in an integer
215 25 Number of bits to be flipped to convert A to B
216 26 Next Power of 2
217 27 Check if a Number is Multiple of 3
218 28 Find parity
219 29 Multiply with 7
220 30 Find whether a no is power of two

221 31 Position of rightmost set bit
222 32 Binary representation of a given number
223 33 Swap all odd and even bits
224 34 Find position of the only set bit
225 35 Karatsuba algorithm for fast multiplication
226 36 How to swap two numbers without using a temporary variable?
227 37 Check if a number is multiple of 9 using bitwise operators
228 38 Swap two nibbles in a byte
229 39 How to turn off a particular bit in a number?
230 40 Check if binary representation of a number is palindrome

Quiz on Bit Algorithms

Graph Algorithms:

Introduction, DFS and BFS:

231 1 Graph and its representations
232 2 Breadth First Traversal for a Graph
233 3 Depth First Traversal for a Graph
234 4 Applications of Depth First Search
235 5 Detect Cycle in a Directed Graph
236 6 Detect Cycle in a an Undirected Graph
237 7 Detect cycle in an undirected graph
238 8 Longest Path in a Directed Acyclic Graph
239 9 Topological Sorting
240 10 Check whether a given graph is Bipartite or not
241 11 Snake and Ladder Problem
242 12 Biconnected Components
243 13 Check if a given graph is tree or not

Minimum Spanning Tree:

244 1 Prim's Minimum Spanning Tree (MST))
245 2 Applications of Minimum Spanning Tree Problem
246 3 Prim's MST for Adjacency List Representation
247 4 Kruskal's Minimum Spanning Tree Algorithm
248 5 Boruvka's algorithm for Minimum Spanning Tree

Shortest Paths:

249 1 Dijkstra's shortest path algorithm
250 2 Dijkstra's Algorithm for Adjacency List Representation
251 3 Bellman–Ford Algorithm
252 4 Floyd Warshall Algorithm
253 5 Johnson's algorithm for All-pairs shortest paths
254 6 Shortest Path in Directed Acyclic Graph

7 Some interesting shortest path questions
8 Shortest path with exactly k edges in a directed and weighted graph

Connectivity:

1 Find if there is a path between two vertices in a directed graph
2 Connectivity in a directed graph
3 Articulation Points (or Cut Vertices) in a Graph
4 Biconnected graph
5 Bridges in a graph
6 Eulerian path and circuit
7 Fleury's Algorithm for printing Eulerian Path or Circuit
8 Strongly Connected Components
9 Transitive closure of a graph
10 Find the number of islands
11 Count all possible walks from a source to a destination with exactly k edges
12 Euler Circuit in a Directed Graph
13 Biconnected Components
14 Tarjan's Algorithm to find Strongly Connected Components

Hard Problems:

1 Graph Coloring (Introduction and Applications)
2 Greedy Algorithm for Graph Coloring
3 Travelling Salesman Problem (Naive and Dynamic Programming)
4 Travelling Salesman Problem (Approximate using MST)
5 Hamiltonian Cycle
6 Vertex Cover Problem (Introduction and Approximate Algorithm)
7 K Centers Problem (Greedy Approximate Algorithm)

Maximum Flow:

1 Ford-Fulkerson Algorithm for Maximum Flow Problem
2 Find maximum number of edge disjoint paths between two vertices
3 Find minimum s-t cut in a flow network
4 Maximum Bipartite Matching
5 Channel Assignment Problem

Misc:

1 Find if the strings can be chained to form a circle
2 Given a sorted dictionary of an alien language, find order of characters
3 Karger's algorithm for Minimum Cut

Quiz on Graph
Quiz on Graph Traversals
Quiz on Graph Shortest Paths

Quiz on Graph Minimum Spanning Tree

Randomized Algorithms:

286 1 Linearity of Expectation
287 2 Expected Number of Trials until Success
288 3 Karger's algorithm for Minimum Cut
289 4 K'th Smallest/Largest Element in Unsorted Array | Set 2 (Expected Linear Time)
290 5 Reservoir Sampling
291 6 Shuffle a given array
292 7 Select a Random Node from a Singly Linked List

Quizzes on Algorithms:

293 1 Analysis of Algorithms
294 2 Sorting
295 3 Divide and Conquer
296 4 Greedy Algorithms
297 5 Dynamic Programming
298 6 Backtracking
299 7 Misc
300 8 NP Complete
301 9 Searching
302 10 Analysis of Algorithms (Recurrences)
303 11 Recursion
304 12 Bit Algorithms
305 13 Graph Traversals
306 14 Graph Shortest Paths
307 15 Graph Minimum Spanning Tree

Misc:

308 1 Commonly Asked Algorithm Interview Questions | Set 1
309 2 Given a matrix of 'O' and 'X', find the largest subsquare surrounded by 'X'
310 3 Nuts & Bolts Problem (Lock & Key problem)
311 4 Flood fill Algorithm – how to implement fill() in paint?
312 5 Given n appointments, find all conflicting appointments
313 6 Check a given sentence for a given set of simple grammer rules
314 7 Find Index of 0 to be replaced with 1 to get longest continuous sequence of 1s in a binary a
315 8 How to check if two given sets are disjoint?
316 9 Minimum Number of Platforms Required for a Railway/Bus Station
317 10 Length of the largest subarray with contiguous elements | Set 1
318 11 Length of the largest subarray with contiguous elements | Set 2
319 12 Print all increasing sequences of length k from first n natural numbers
320 13 Given two strings, find if first string is a subsequence of second

14 Snake and Ladder Problem
15 Write a function that returns 2 for input 1 and returns 1 for 2
16 Connect n ropes with minimum cost
17 Find the number of valid parentheses expressions of given length
18 Longest Monotonically Increasing Subsequence Size (N log N): Simple implementation
19 Generate all binary permutations such that there are more 1's than 0's at every point in al
20 Lexicographically minimum string rotation
21 Construct an array from its pair-sum array
22 Program to evaluate simple expressions
23 Check if characters of a given string can be rearranged to form a palindrome
24 Print all pairs of anagrams in a given array of strings

ted

Part 4

loops

y add up to 9

array

l permutations