1. Find the M-th maximum number and Nth minimum number in an array and then find the sum and difference of it.

Test cases: output –

a. {16, 16, 16 16, 16}, M = 0, N = 1 (illegal input)

b. {0, 0, 0, 0}, M = 1, N = 2 0

c. {-12, -78, -35, -42, -85}, M = 3 , N = 3 -7

d. {15, 19, 34, 56, 12}, M = 6 , N = -3 (illegal input)

e. {85, 45, 65, 75, 95}, M = 5 , N = 2 -20

1. Given an array of integers nums which is sorted in ascending order, and an integer target, write a function to search target in nums. If target exists, then return its index. Otherwise, return -1.integer target. Write a program to search a number in a list using binary search and estimate time complexity

Test cases:

Input : ( 45, 4, 23, -11, 20, 5, 10, 50) Key element 5 Output Found in the position 2

Input : ( 8,-2, 11, 8, 6, 3 10,0) Key element 2 Output Not found

1. Write a program to find the reverse of a given number. Find and write the time complexity

Input / Output

1234 - 4321

67894 - 49876

45a34 - Illegal input

1. Write a program to compute Binomial coefficient for n=8, k=8 using dynamic programming

Using condition such as

I nCk =1 if k=0 or n=k

II nCk – (n-1)Ck-1 + (n-1)Ck for n>k>0

1. Write a program to perform sum of subsets problem using backtracking and find the time complexity.

Input / Output

Input : Set (s) = (6, 2,8,1,5) sum is 9 Set (s) = (6, -4, 7, -1, 5, 2,8,1,) sum is 10

Output : Subset is (6,2,1) (2,8,1) Subset is (6,-4, 8) (2,8)

1. Write a program to check the given number is Armstrong or not.

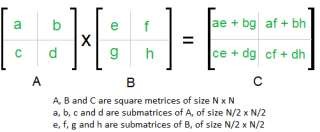
The k-digit number N is an Armstrong number if and only if the k-th power of each digit sums to N.

Given a positive integer N, return true if and only if it is an Armstrong number. Input : 153 Input : 419

Output : True Output : False

1. Write a program to perform Strassen’s Matrix Multiplication for the 2\*2 matrix elements. Find its time complexity.

Example:



1. Write a program to find the Factorial of a number using recursive method and write its time complexity.

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1. Given an array of integers nums which is sorted in ascending order, and an integer target, write a function to search target in nums. If target exists, then return its index. Otherwise, return -1. You must write an algorithm with O(log n) runtime complexity.
2. Write a program to find the GCD of two numbers. Find time complexity if recursion is

used Perform the test cases for the given set of no’s

A. (36,48) 2

B. (156, 90) 6

C. (-56,88) Illegal input

1. Find Max and Min value in the list using divide and conquer find its time complexity.

Testing Condition – Count the number of times in Comparison to find Min\_Max value in a list n for the given set of elements.

A. (23,45,6,8,-9,44,7,8) Min val = -9, Max Value = 45

B. (8,-5,7,2,6,0,1,9) Min val = -5, Max Value = 9

C. (45, y, 9, 8,4, 7,11, 22,16) Illegal input

1. Generate a program for Pascal triangle. Estimate the time complexity for the row=5

1

1 1

1 2 1

1 3 3 1

1. 4 6 4 1
2. Write a program to find the sum of digits. You are given a **0- indexed** array nums consisting of **positive** integers. You can choose two indices i and j, such that i != j, and the sum of digits of the number nums[i] is equal to that of nums[j]. Return *the* **maximum** *value of* nums[i] + nums[j] *that you can obtain over all possible indices* i *and* j *that satisfy the conditions.*
3. Consider a two integer arrays nums1 and nums2, sorted in non-increasing order and two integers m and n, representing the number of elements in nums1 and nums2 respectively. Write a program to Merge them into a single array using Merge Sort. Derive time complexity of merge sort

.Input Set[], A = (3,8,1,9) Set[], B = (4,-2, 0,7) Output A \* B = (-2,0,1,3,4,7,9)

1. Write a program to find all pairs shortest path using Floyd's technique and to estimate its time complexity.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | A | B | C | D |
| A | 0 | 8 | 7 | 8 |
| B | 9 | 0 | 11 | 12 |
| C | 10 | 9 | 0 | 11 |
| D | 8 | 10 | 11 | 0 |

1. Write a program to perform linear search and estimate time complexity. Compute the amount of time for completion.

Input/ Output series

|  |  |  |
| --- | --- | --- |
| A = (56,89,7,13,75, 23, 8, 12) | Key element 75 | Element found in position 4 |
| B = (89,45 -23,45,0, 44, 2) | Key element 0 | Element found in position 5 |
| C = (45,67,56,A,34,-2,100) | Key element 90 | Not Found |

1. Write a program to compute Binomial coefficient for n=8, k=8 using dynamic programming Using condition such as

I nCk =1 if k=0 or n=k

II nCk – (n-1)Ck-1 + (n-1)Ck for n>k>0

1. Write a program to find the factorial (fact)of a number and to estimate time complexity.

Conditions such as i. n=0, return 1 otherwise fact (n-1) \* n Testing condition

* + 4 Value is 24
  + -3 No negative value
  + 6 Value is 720

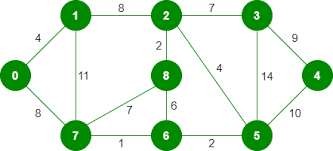
1. Write a program to perform Knapsack problem using dynamic programming for the following set of object values.,

Knapsack weight = 100

|  |  |  |
| --- | --- | --- |
| item | Weight | Profit |
| 1 | 40 | 80 |
| 2 | 30 | 70 |
| 3 | 20 | 50 |
| 4 | 30 | 80 |

.

1. Write a program to find a minimum spanning tree using prims technique for the given graph.



1. Write a program to print the first n perfect numbers. (Hint Perfect number means **a positive**

integer that is equal to the sum of its proper divisors)

Sample Input:

N = 3

Sample Output:

First 3 perfect numbers are: 6 , 28 , 496 Test Cases:

1. N = 0

2. N = 5

3. N = -2

4. N = -5

5. N = 0.2

1. Write a [Program to find even Sum of Fibonacci Series Till number N](https://www.geeksforgeeks.org/java-program-to-find-sum-of-fibonacci-series-numbers-of-first-n-even-indexes/)? Sample Input: n = 4

Sample Output: 33

(N = 4, So here the Fibonacci series will be produced from 0th term till 8th term: 0, 1, 1, 2, 3, 5, 8, 13, 21

Sum of numbers at even indexes = 0 + 1 + 3 + 8 + 21 = 33)

1. Write a program to perform Selection sort and estimate time Complexity Estimate the time iteration for the following set of numbers.

Input Output

A. (10,5, 80,-2, 15,23, 45) (-2, 5, 10, 15, 23, 45, 80)

B. (12, 3, 0, 34, -11, 2, 8) (-11, 0, 3, 8, 12, 22, 34

1. A [**perfect number**](https://en.wikipedia.org/wiki/Perfect_number) is a **positive integer** that is equal to the sum of its **positive divisors**, excluding the number itself. A **divisor** of an integer x is an integer that can divide x evenly.

Given an integer n, return true *if* n *is a perfect number, otherwise return* false.

. 25. Write a program to check for the following cases and find its time complexity Case 1: Given string is palindrome or not

Case 2: Given number is palindrome or not

Sample Input:

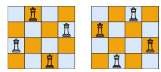
Case = 1

String = MADAM Sample Output:

Palindrome Test cases:

* + MONEY 2. 5678765

1. MALAY12321ALAM
2. MALAYALAM 5. 1234.4321
   * Write a program to insert a number in a list Testing Condition
     + Insert at the beginning
     + Insert in the middle
     + Insert at the last
     + Not Available position in a list
   * The n-queens puzzle is the problem of placing n queens on an n x n chessboard such that no two queens attack each other. Given an integer n, return all distinct solutions to the n-queens puzzle. You may return the answer in any order. Write a program for the same.



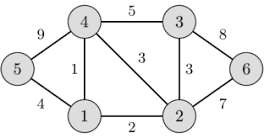
* + Write a [Program to find even Sum of Fibonacci Series Till number N](https://www.geeksforgeeks.org/java-program-to-find-sum-of-fibonacci-series-numbers-of-first-n-even-indexes/)? Sample Input: n = 4

Sample Output: 33

(N = 4, So here the Fibonacci series will be produced from 0th term till 8th term: 0, 1, 1, 2, 3, 5, 8, 13, 21

Sum of numbers at even indexes = 0 + 1 + 3 + 8 + 21 = 33)

Write a program to perform Minimum spanning tree using greedy techniques and estimate time complexity for the given set of values.



Write a program to perform Knapsack problem using greedy approach for the following set of object values.,

Knapsack weight = 100

|  |  |  |
| --- | --- | --- |
| item | Weight | Profit |
| 1 | 40 | 80 |
| 2 | 30 | 70 |
| 3 | 20 | 50 |
| 4 | 30 | 80 |

Write a program to perform Quick sort and estimate time complexity.

Input Output

(10,5, 80,-2, 15,23, 45) (-2, 5, 10, 15, 23, 45, 80)

(12, 3, 0, 34, -11, 2, 8) (-11, 0, 3, 8, 12, 22, 34

Write a program to print the reverse of a string. And estimate the time complexity for the given inputs.

Test cases: output –

“ as\nr5Y” Y5rn|sa

“7yut02” 20tuy7

“EryEq qEyrE

Write a program to perform Bubble sort and estimate time Complexity for n values.

Perform test cases for the following set of numbers. Estimate the time iteration for the following set of numbers.

Input Output

(10,5, 80,-2, 15,23, 45) (-2, 5, 10, 15, 23, 45, 80)

(12, 3, 0, 34, -11, 2, 8) (-11, 0, 3, 8, 12, 22, 34

Given a sorted array keys[0.. n-1] of search keys and an array freq[0.. n-1] of frequency counts, where freq[i] is the number of searches to keys[i]. Construct a binary search tree of all keys such that the total cost of all the searches is as small as possible.

Example

**Input:**

n = 2

keys = {10, 12}

freq = {34, 50}

**Output:** 118

**Explanation:**

There can be following two possible BSTs

10

\

12

12

/

10

*The cost of tree I is 34\*1 + 50\*2 = 134*

*The cost of tree II is 50\*1 + 34\*2 = 118*

Write a program to perform permutation of an array of integers and make all the arrangement are to be in possible sequence.

Input a{]={1,2,3) Output [1,2,3], [1,3,2], [2, 1, 3], [2, 3, 1], [3,1,2], [3,2,1].

Write a program to print first 2 minimum values from the numbers in below list.

Input a[]=(3, 5, -4, 1, 8, 2, 0, 4) Output (-4, 0)

`

Write a program to check whether the given no is palindrome or not Given an integer x, return true if x is a palindrome, and false otherwise

input out put

121 True

234 False

4554 True

Write a program for the given pattern the given pattern If n=4

1

1 2

1 2 3

1 2 3 4

Write a program to find out Hamiltonian circuit using backtracking method. And find the time complexity for the given set of elements is

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | a | b | c | d | e | f |
| a | 0 | 0 | 1 | 1 | 1 | 1 |
| b | 0 | 0 | 1 | 0 | 0 | 1 |
| c | 1 | 1 | 0 | 1 | 1 | 1 |
| d | 1 | 0 | 1 | 0 | 1 | 0 |
| e | 1 | 0 | 0 | 1 | 0 | 0 |
| f | 1 | 1 | 1 | 0 | 0 | 0 |

Write a program to return all the possible subsets for a given integer array. Return the solution in any order.

Input nums= [1,2,3]

Output : [ [], [1], [2], [3], [1,2], [1,3], [2,3], [1,2,3]]