**Module 20 Practice**

1. Given an integer array A with size N and an integer K,where 0< N, K <10^5 . Write a program for getting Kth minimum and Kth maximum number from the given array.

**Sample input:**

6 3

1 13 20 4 15 17

**Sample output:**

13 15

**Explanation:** 1st minimum: 1, 2nd minimum: 4, third minimum: 13

1st maximum: 20, 2nd maximum: 17, 3rd maximum: 15

1. Given an integer N. Write a program to print all prime numbers between 1 and N.

**Sample input:**

5

**Sample output:**

2 3 5

1. Why is the complexity of binary search O(logN) where N is the size of the list? Explain.
2. Given an integer array A with size N and an integer Q for queries, where 0< N,Q < 10^6.

Write a program using prefix sum concept to find the sum of a given range L to R for each query. (1 <= L,R <= N and L <= R)

N

A1 A2 A3…….AN

Q

L1 R1

L2 R2

. .

. .

LQ RQ

**Sample input:**

6

1 2 3 4 5 6

3

1 3

4 6

2 4

**Sample output:**

6

15

9

1. Given an integer array A with size N and an integer Q for queries, where

(0 < N < 10^5) , (-10^7 < Ai < 10^7) and (0 < Q < 10^7) .

Write a program using prefix sum concept to find the sum of positive integers from a given range L to R for each query. (1 <= L,R <= N)

N

A1 A2 A3…….AN

Q

L1 R1

L2 R2

. .

. .

LQ RQ

**Sample input:**

6

1 -2 3 -4 5 6

3

1 3

4 6

2 4

**Sample output:**

4

11

3

1. Given a sorted integer array A with size N integers and an integer k. Write a program to find out the position of k from array A using binary search.

**Sample input:**

7 9

1 2 3 4 9 7 8

**Sample output:**

5

1. Given an integer array A with size N. Write a program to print the number of distinct integers in A.

**Sample input:**

7

2 3 3 4 5 5 5

**Sample output:**

4

1. Given a matrix A with dimension n\*m. Write a program to print the sum of the elements where the rows are **even** and the columns are **odd** .

**Sample input:**

3 3

1 2 3

4 5 6

7 8 9

Sample output:

10

[Here ,highlighted 4 is located in the 2nd row and 1st column , 6 is located in the 2nd row and 3rd column. ]

1. Given an integer array A with size N and k. Write a program to find out how many pairs exist in array A whose sum is equal to k.

**Sample input:**

7 8

1 2 3 4 5 6 7

**Sample output:**

3

[Here, 1+7=8, 2+6=8, 3+5=8 ]

1. For a sorted array, which of the following algorithms will take less time ? Explain with examples.

i)Bubble sort.

ii)Insertion sort

iii)Counting sort.

1. Write a function named insert\_node() that inserts a value at the end of a singly linked list. If there are no nodes, it will insert a head.
2. Write a function named insert\_node\_by\_position() that inserts a value at any position of the singly linked list. You can assume that if there are 5 nodes in the list, the positions are 0, 1, 2, 3 and 4.
3. Write a function named delete\_node\_by\_position() that deletes a node from the singly linked list. If there is only one node left, it will delete the head.
4. Write a function named count\_node() to count the number of nodes in that singly linked list.
5. Write a function named move\_tail() which will move the tail to the first position of the list.

For example: If the list looks like this,

List: 2 -> 4 -> 1 -> 10 -> 5

After the operation the list will look like this,

List: 5 -> 2 -> 4 -> 1 -> 10

1. Write a function insert\_node() to insert a value at the end of a doubly linked list. If there are no nodes, it will insert a head.
2. Write a function named insert\_node\_by\_position() that inserts a value at any position of the doubly linked list. You can assume that if there are 5 nodes in the list, the positions are 0, 1, 2, 3 and 4.
3. Write a function named delete\_node\_by\_position() that deletes a node from the doubly linked list. If there is only one node left, it will delete the head.
4. Write a function named move\_head() which will move the head to the last position of the list.

For example: If the list looks like this,

List: 2 <-> 4 <-> 1 <-> 10 <-> 5

After the operation the list will look like this,

List: 4 <-> 1 <-> 10 <-> 5 <-> 2

1. If you are excited about trying new things, try to sort a singly linked list.

Resource: <https://www.geeksforgeeks.org/insertion-sort-for-singly-linked-list/>