

## **Week-3:**

### **TASK1:**

**Aim:** To find the lexicographically smallest and largest substrings of length k from a given string.

### **Algorithm:**

1. Start.
2. Read the input string s and integer k.
3. Initialize smallest and largest with the first substring of length k.
4. Loop from index 1 to (length of string – k):
5. Extract substring sub of length k.
6. Compare sub with smallest:
7. If sub is smaller, update smallest.
8. Compare sub with largest:
9. If sub is larger, update largest.
10. After checking all substrings, return smallest and largest.
11. Print the result.
12. Stop.

### **Program:**

```
import java.util.Scanner;  
  
public class Solution {  
  
    public static String getSmallestAndLargest(String s, int k) {  
  
        String smallest = s.substring(0, k);  
  
        String largest = s.substring(0, k);  
  
        for (int i = 1; i <= s.length() - k; i++) {  
  
            String sub = s.substring(i, i + k);  
  
            if (sub.compareTo(smallest) < 0)  
                smallest = sub;  
  
            if (sub.compareTo(largest) > 0)  
                largest = sub;  
  
        }  
    }  
}
```

```

        return smallest + "\n" + largest;
    }

    public static void main(String[] args) {
        Scanner scan = new Scanner(System.in);
        String s = scan.next();
        int k = scan.nextInt();
        scan.close();
        System.out.println(getSmallestAndLargest(s, k));
    }
}

```

## Output:

### Congratulations!

You have passed the sample test cases. Click the submit button to run your code against all the test cases.



Sample Test case 0

Input (stdin)

```

1 welcometojava
2 3

```

[Download](#)

Your Output (stdout)

```

1 ava
2 wel

```

[Download](#)

Expected Output

```

1 ava
2 wel

```

**Result:** The program successfully identifies and displays the smallest and largest substrings of length k from the given string using lexicographical comparison.

## **Task-2:**

**Aim:** To sort Player objects in descending order based on score and, when scores are equal, in ascending alphabetical order based on name.

This ensures proper ranking with clear tie-breaking using player names.

## **Algorithm:**

1. Start.
2. Receive two Player objects: a and b.
3. Compare their scores:
4. If a.score is not equal to b.score, return  $(b.score - a.score)$  to sort in descending order.
5. If scores are equal:
6. Compare a.name and b.name using compareTo() to sort alphabetically (ascending).
7. Return the comparison result.
8. Stop.

## **Program:**

```
class Checker implements Comparator<Player> {  
    public int compare(Player a, Player b){  
        if(a.score != b.score){  
            return b.score - a.score;  
        }  
        return a.name.compareTo(b.name);  
    }  
}
```

## Output:

### Congratulations!

You have passed the sample test cases. Click the submit button to run your code against all the test cases.

#### Sample Test case 0

Input (stdin)

```
1 5
2 amy 100
3 david 100
4 heraldo 50
5 aakansha 75
6 aleksa 150
```

Download

Your Output (stdout)

```
1 aleksa 150
2 amy 100
3 david 100
4 aakansha 75
```

## Result:

Thus, to sort Player objects in descending order based on score and, when scores are equal, in ascending alphabetical order based on name was executed successfully.

### **Task3:**

**Aim:** To sort a list of students based on CGPA in descending order, first name in ascending alphabetical order, and ID in ascending order when previous values are equal.

### **Algorithm:**

1. Start the program.
2. Read the number of test cases (students).
3. For each student:
  - a. Read ID, first name, and CGPA.
  - b. Create a Student object and add it to the list.
4. Use Collections.sort() with a custom Comparator to sort students by:
  - a. CGPA (descending order).
  - b. First name (ascending order) if CGPA is same.
  - c. ID (ascending order) if both CGPA and name are same.
5. Display the sorted student names.
6. Stop.

### **Program:**

```
import java.util.*;  
  
class Student {  
  
    int id;  
  
    String fname;  
  
    double cgpa;  
  
    public Student(int id, String fname, double cgpa) {  
  
        this.id = id;  
  
        this.fname = fname;  
  
        this.cgpa = cgpa;  
  
    }  
  
    public int getId() {  
  
        return id;  
  
    }  
  
    public String getFname() {
```

```
    return fname;
}

public double getCgpa() {
    return cgpa;
}

}

class Solution {
    public static void main(String[] args) {
        Scanner in = new Scanner(System.in);
        int testCases = Integer.parseInt(in.nextLine());
        List<Student> studentList = new ArrayList<Student>();
        while(testCases > 0){
            int id = in.nextInt();
            String fname = in.next();
            double cgpa = in.nextDouble();
            Student st = new Student(id, fname, cgpa);
            studentList.add(st);
            testCases--;
        }
        Collections.sort(studentList, new Comparator<Student>(){
            public int compare(Student s1, Student s2) {
                if(s1.cgpa != s2.cgpa){
                    return Double.compare(s2.cgpa, s1.cgpa);
                }
                if(!s1.fname.equals(s2.fname)){
                    return s1.fname.compareTo(s2.fname);
                }
            }
        });
    }
}
```

```
        return s1.id - s2.id;  
    }  
});  
for(Student st: studentList){  
    System.out.println(st.getFname());  
}  
}  
}
```

## Output:

The screenshot shows a code submission interface. At the top, a green success message says "Congratulations! You have passed the sample test cases. Click the submit button to run your code against all the test cases." Below this, there's a section for "Sample Test case 0". It shows the input (stdin) and the output (stdout). The input contains six lines of student records, each with a rank, name, and grade. The output shows the first four students' names listed.

Rank	Name	Grade
5	Rumpa	3.68
85	Ashis	3.85
56	Samiha	3.75
19	Samara	3.75
22	Fahim	3.76

Your Output (stdout)

1	Ashis
2	Fahim
3	Samara
4	Samiha

**Result:** Thus ,the program successfully sorts all student records according to the given priority rules and prints the students' first names in the correct ranked order was executed successfully.

#### **Task4:**

**Aim:** To sort people's names based on their heights in descending order, so that the tallest person appears first.

#### **Algorithm:**

1. Start.
2. Accept two arrays: names[] and heights[].
3. Find the length of the heights array and store it in n.
4. Use Bubble Sort to arrange heights in descending order:
  - o Compare each height with the remaining heights.
  - o If the current height is smaller, swap both heights.
  - o At the same time, swap the corresponding names to maintain mapping.
5. Repeat until all elements are sorted.
6. Return the sorted names array.
7. Stop.

#### **Program:**

```
class Solution {  
  
    public String[] sortPeople(String[] names, int[] heights) {  
  
        int n = heights.length;  
  
        for(int i = 0; i < n - 1; i++){  
  
            for(int j = i + 1; j < n; j++){  
  
                if(heights[i] < heights[j]){  
  
                    int tempH = heights[i];  
  
                    heights[i] = heights[j];  
  
                    heights[j] = tempH;  
  
                    String tempN = names[i];  
  
                    names[i] = names[j];  
  
                    names[j] = tempN;  
                }  
            }  
        }  
    }  
}
```

```

    }
}

}

return names;

}
}

```

## Output:

The screenshot shows a Java code submission for LeetCode problem 2418. The code implements a bubble sort algorithm to sort names by height in descending order. The submission is successful, with the input [180, 165, 170] resulting in the output ["Mary", "Emma", "John"].

```

Java v Auto
1 class Solution {
2     public String[] sortPeople(String[] names, int[] heights) {
3
4         int n = heights.length;
5
6         // Bubble sort based on heights (descending)
7         for(int i = 0; i < n - 1; i++){
8             for(int j = i + 1; j < n; j++){
9                 if(heights[i] < heights[j]){
10                    // swap heights
11
12                }
13            }
14        }
15    }
16 }

Saved Ln 1, Col 1

```

**Example 1:**

**Input:** names = ["Mary", "John", "Emma"], heights = [180, 165, 170]  
**Output:** ["Mary", "Emma", "John"]  
**Explanation:** Mary is the tallest, followed by Emma and John.

**Example 2:**

**Input:** names = ["Alice", "Bob", "Bob"], heights = [155, 185, 150]  
**Output:** ["Bob", "Alice", "Bob"]  
**Explanation:** The first Bob is the tallest, followed by Alice and the second Bob.

**Constraints:**

- $n == \text{names.length} == \text{heights.length}$

1.8K 175 9 Online

Testcase | Test Result

heights =  
[180, 165, 170]

Output  
["Mary", "Emma", "John"]

Expected  
["Mary", "Emma", "John"]

Contribute a testcase

**Result:** The program successfully sorts the people according to their heights in descending order and returns the names in the correct order, with the tallest person listed first.

## **Task 6:**

**Aim:** To find the Nth prime number using a Java program.

Algorithm:

1. Start with count = 0 and num = 1.
2. Increment num by 1.
3. Check whether num is a prime number.
4. If num is prime, increment count.
5. Repeat steps 2–4 until count equals the given input (input1).
6. Return num as the Nth prime number.

## **Program:**

```
class UserMainCode
{
    public int NthPrime(int input1){

        int count = 0;
        int num = 1;

        while(count < input1){
            num++;
            if(isPrime(num)){
                count++;
            }
        }

        return num;
    }
}
```

```
private boolean isPrime(int n){
```

```
    if(n < 2) return false;
```

```
    for(int i = 2; i * i <= n; i++){
```

```
        if(n % i == 0)
```

```
            return false;
```

```
}
```

```
    return true;
```

```
}
```

## Output:

1. Program

Question 1

How to Attempt? Revisit Later

**pyNth Prime**  
Write a function that finds and returns the Nth prime number. N will be passed as input to the function.  
**Assumption:** 1 <= N <=1000, where N is the position of the prime number

The first prime number is 2  
The second prime number is 3  
The third prime number is 5  
The fourth prime number is 7  
The fifth prime number is 11  
... and so on.

**Example1:** If the given number N is 10, the method must return the 10th prime number i.e. 29  
**Example2:** If the given number N is 13, the method must return the 13th prime number i.e. 41

Attempted: 1/1

Default 2

CODE EXECUTION DETAILS  
Time: 201 ms  
Memory: 57688 kb

TEST CASE INFORMATION  
Input: 15  
Expected Output: 47  
Actual Output: 47

CONSOLE OUTPUT

**Result:** The program successfully returns the Nth prime number.

### **Task 8:**

**Aim:** To find the lexicographically smallest and largest substrings of length k from a given string.

**Algorithm:**

1. Take the first substring of length k as both smallest and largest.
2. Loop from index 1 to length of string – k.
3. Extract each substring of length k.
4. Compare the substring with smallest and largest using compareTo().
5. Update smallest if substring is smaller.
6. Update largest if substring is larger.
7. Print the smallest and largest substrings.

**Program:**

```
import java.util.Scanner;

public class Solution {

    public static String getSmallestAndLargest(String s, int k) {

        String smallest = s.substring(0, k);

        String largest = s.substring(0, k);

        for (int i = 1; i <= s.length() - k; i++) {

            String sub = s.substring(i, i + k);

            if (sub.compareTo(smallest) < 0)

                smallest = sub;

            if (sub.compareTo(largest) > 0)

                largest = sub;

        }

    }

}
```

```

        return smallest + "\n" + largest;
    }

public static void main(String[] args) {
    Scanner scan = new Scanner(System.in);
    String s = scan.next();
    int k = scan.nextInt();
    scan.close();

    System.out.println(getSmallestAndLargest(s, k));
}

}

```

Output:

The screenshot shows a user interface for code execution. At the top, there are tabs for "Code Execution" and "Code History". Below the tabs, it says "0/2 - Sample Test Cases Failed". The main area is titled "default". It contains sections for "CODE EXECUTION DETAILS" (Time: 120 ms, Memory: 57688 kb), "TEST CASE INFORMATION" (Input: 123456732128989543219,987612673489652, Expected Output: 123457719741663032871, Actual Output: 123457719741663032871), and "CONSOLE OUTPUT" (None). There is also a section for "STANDARD ERROR/WARNING" which is empty.

**Result:** The programs was successfully find the lexicographically smallest and largest substrings of length k from a given string.

### **Task 9:**

**Aim:** To compute a result by performing **addition and subtraction on numbers from N to 1** based on the selected option.

### **Algorithm:**

1. Read the value of N and the option opt.
2. Initialize result to 0 and a boolean variable add to control addition/subtraction.
3. Loop from N down to 1.
4. If opt == 1:
5. If opt == 2:
6. Update the result in each iteration.
7. Return the final computed value.

### **Program:**

```
class UserMainCode
{
    public int AddSub(int input1, int input2){

        int N = input1;
        int opt = input2;

        int result = 0;
        boolean add = true;

        if(opt == 1){
            add = true; // start with +
        }else{
            add = true; // opt2 also starts with +
        }
    }
}
```

```
for(int i = N; i >= 1; i--){
```

```
    if(opt == 1){
```

```
        // Pattern: + - + - ...
```

```
        if(add)
```

```
            result += i;
```

```
        else
```

```
            result -= i;
```

```
        add = !add;
```

```
}
```

```
    else{
```

```
        // Pattern: + + - + - ...
```

```
        if(i == N || i == N-1){
```

```
            result += i;
```

```
}
```

```
        else{
```

```
            if(add)
```

```
                result -= i;
```

```
            else
```

```
                result += i;
```

```
        add = !add;
```

```
    }  
}  
}  
}
```

```
return result;
```

```
}
```

## Output:

The screenshot shows a programming test interface. On the left, there's a sidebar with '1. Program' selected. The main area has a header 'Attempted: 1/1' and '0/4 - Sample Test Cases Failed'. Below this, there's a section for 'Question 1' with a 'Revisit Later' button. The question asks to find the result after alternate addition and subtraction on N. It provides examples for opt=1 and opt=2, and a function prototype. To the right, there's a 'default' test case details panel. It shows 'CODE EXECUTION DETAILS' with time and memory usage, and 'TEST CASE INFORMATION' with input (10000.2), expected output (15000), and actual output (15000). A 'CONSOLE OUTPUT' section is also present.

**Result:** The program successfully calculates the final value by applying the specified addition and subtraction pattern to the numbers from N to 1 based on the given option.