

## COMPUTING LAB – ASSIGNMENT 3

MTech(CS) I year 2020–2021

**Deadline:** 15 January, 2022

Total: 60 marks

### SUBMISSION INSTRUCTIONS

1. Naming convention for your programs: `cs21xx-assign3-progy.c` or `cs21xx-assign3-progy.py` (assuming `cs21xx` denotes your roll number and `progy` denotes the program number).
2. To submit the solution files (`.c`, `.py` or `.h`), ensure that they not password protected and mail them together to `<assignisik@gmail.com>` with the subject line as follows:  
MTech (CS) 2021-23 cs21xx Computing Lab - assignment3.
3. You may consult or use slides / programs provided to you as course material, or programs that you have written yourself as part of classwork / homework for this course, but please **do not** consult or use material from other Internet sources, your classmates, or anyone else.
4. Please make sure that your programs adhere strictly to the specified input and output format. **You may lose marks if your program violates the input and output requirements.**
5. Submissions from different students having significant match will be **debarred from evaluation.**

**NOTE:** Unless otherwise specified, all programs should take the required inputs from stdin, and print the desired outputs to stdout.

- Q1. Suppose you are given with an erroneous function `CONCAT(char *, char *)` for concatenating multiple strings (irrespective of the order). Due to the bug in the function, it concatenates the argument strings in both ways and concatenate them further to return the result. For example, `CONCAT("A", "B")` will return the string `ABBA`. Given a list of strings to concatenate with each other (in any arbitrary order) employing the `CONCAT(char *, char *)` function, what is the maximum length of the final string that might get generated.

[20 marks]

#### Input Format

The input (to be read from stdin) comprises multiple strings provided in the same line

#### Output Format

The output (to be printed to stdout) will show the maximum length of the final string that might get generated.

#### Sample Input 0

Malay ISI

#### Sample Output 0

16

**Sample Input 1**

abcd efg hi

**Sample Output 1**

32

**Sample Input 2**

merge heap bubble insertion

**Sample Output 2**

148

- Q2. Let there be a large array of prime numbers, say  $A$ , in increasing order. Write a program to efficiently search for an element in the said array  $A$ . Consider that the indexing in  $A$  starts from 0.

[20 marks]

**Input Format**

The input (to be read from stdin) is an integer (say  $i$ ) to search for followed by a large array of prime numbers in the next line.

**Output Format**

The output (to be printed to stdout) is the index of the integer  $i$  in the given large array  $A$ . If  $i$  is not present in  $A$ , return ABSENT.

**Sample Input 0**

13

2 3 5 7 11 13 17 19 23 29 31

**Sample Output 0**

5

**Sample Input 1**

861

811 821 823 827 829 839 853 857 859 863 877 881 883 887 907 911 919 929 937 941

**Sample Output 1**

ABSENT

**Sample Input 2**

181

179 181 191 193 197 199 211 223 227 229 233 239 241 251 257 263 269

**Sample Output 2**

1

- Q3. Suppose the Indian Government is taking an initiative to set up several new Indian Institute of Entrepreneurship (IIE) around the country. For making a decision about where to set it up, they have made an open call to the citizens of India. Anybody can submit any number of cities as the location. Write a program to choose the top  $k$  cities that have been proposed by the respondents to the call.

[20 marks]

**Input Format**

The input (to be read from stdin) starts with an integer  $k$ . It is followed by multiple lines where each line corresponds to a number of cities (not necessarily bounded by  $k$ ) proposed by a single respondent.

**Output Format**

The output (to be printed to stdout) is the top  $k$  cities. In the case of a tie, you can make an arbitrary choice.

**Sample Input 0**

```
2
Kolkata Chennai
Naihati Delhi Kochi
Kolkata
Guwahati Indore Delhi
Kochi Jaipur
Madurai Salem
```

**Sample Output 0**

```
Kolkata Kochi
```

**Sample Input 1**

```
3
Lucknow Kanpur Ahmedabad
Agra Nasik
Ranchi
Rajkot Meerut Nasik Dhanbad
Salem Guntur
Guntur
Kolkata Bikaner
Ranchi Guntur
```

**Sample Output 1**

```
Guntur Ranchi Nasik
```

**Sample Input 2**

```
1
Mumbai
Mumbai Jammu
```

**Sample Output 2**

```
Mumbai
```