

**National Institute of Technology, Calicut**  
**Department of Computer Science and Engineering**  
**Monsoon2021**  
**CS2092D – PROGRAMMING LABORATORY (MCA-I A )**  
**Assignment-4**

**Policies for Submission and Evaluation**

You must submit your assignment in the moodle (Eduserver) course page, on or before the submission deadline. Also, ensure that your programs in the assignment must compile and execute without errors in Athena server. During evaluation your uploaded programs will be checked in Athena server only. Failure to execute programs in the assignment without compilation errors may lead to zero marks for that program.

Your submission will also be tested for plagiarism, by automated tools. In case your code fails to pass the test, you will be straightaway awarded zero marks for this assignment and considered by the examiner for awarding F grade in the course. Detection of ANY malpractice regarding the lab course will also lead to awarding an F grade.

**Naming Conventions for Submission**

Submit a single ZIP (.zip) file (do not submit in any other archived formats like .rar or .tar.gz). The name of this file must be ASSG<NUMBER>\_<ROLLNO>\_<FIRSTNAME>.zip. (For example: ASSG4\_BxxxxxyCS\_LAXMAN.zip). DO NOT add any other files (like temporary files, inputfiles, etc.) except your source code, into the zip archive. The source codes must be named as

ASSG<NUMBER>\_<ROLLNO>\_<FIRSTNAME>\_<PROGRAM-NUMBER>.<extension>

(For example: ASSG4\_BxxxxxyCS\_LAXMAN\_1.c). If there are multiple parts for a particular question, then name the source files for each part separately as in

ASSG4\_BxxxxxyCS\_LAXMAN\_1b.c.

If you do not conform to the above naming conventions, your submission might not be recognized by some automated tools, and hence will lead to a score of 0 for the submission. So, make sure that you follow the naming conventions.

**Standard of Conduct**

Violations of academic integrity will be severely penalized. Each student is expected to adhere to high standards of ethical conduct, especially those related to cheating and plagiarism. Any submitted work MUST BE an individual effort. Any academic dishonesty will result in zero marks in the corresponding exam or evaluation and will be reported to the department council for

record keeping and for permission to assign an F grade in the course. The department policy on academic integrity can be found at:

[http://minerva.nitc.ac.in/cse/sites/default/files/attachments/news/Academic-Integrity\\_new.pdf](http://minerva.nitc.ac.in/cse/sites/default/files/attachments/news/Academic-Integrity_new.pdf) .

#### **Assignment 4** **Questions**

1.

(a): Jerry is a health-conscious mouse who loves eating cheese. He likes cheese so much but he eat cheese in such a way that he obtain required amount of calories. Currently, he has N cheese with distinct calorie value  $a_0, a_1, \dots, a_{n-1}$ . Jerry wants his total calorie intake to be K. Help Jerry to decide that he can achieve a total calorie diet of K or NOT (Implement task using recursion).

Test case

input: [1,3,4,16,8,10,22], K=21

output: YES

Explanation:

Jerry can be obtain 21 unit calories by eating cheese  $a_0, a_2, a_3$ . There may be more than one solution possible but you simply print YES or NO.

input: [10,20,30,40,50,60,70], K=55

output: NO

input: [4,4,4,4,5,8,9], K= -17

output: NO

(b): In continuation, if Jerry have an unlimited amount of cheese that contain only 1-unit calories and 2-unit calories then, how many ways Jerry can get the required amount of calories (implement using recursion).

Test case:

input: K=2

output: 2

input: K=10

output: 89

2.

(a): Write a program that reads n distinct integers of an array A, given in ascending order and checks whether a given integer k is present in the array using recursive binary search. If k is present in the array, print its index in A. Otherwise, print -1. Also print the number of calls made to the recursive binary search function over the course of the program.

Test case:

input: [12 35 50 59 60 73 90] k=73

output:

index:5

No of Calls:2

input: [12 35 50 59 60 73 90] k=100

output:

index:-1

No. of calls:4

(b): Modify your program for Question 2(a) such that it reads n integers (not necessarily distinct) of an array A, given in ascending order and checks whether a given integer k is present in the array using recursive binary search. If k is present in the array, print the index of its first occurrence in A. Otherwise, print -1. Also print the number of calls to recursive function made over the course of the program.

Test case:

input: [12 35 50 59 60 73 90], k=73

output:

index:5

No of Calls:2

input: [1,1,2,2,2,2,2,2,3,3,3,3,3], k=3

output:

index:9

No. of calls:3