

National Institute of Technology, Calicut
Department of Computer Science and Engineering
Monsoon2021
CS2092D – PROGRAMMING LABORATORY (MCA-I A)
Assignment-3

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 .

Assignment Question

1. Given an array of N non negative integers $X=[x_1, x_2, \dots, x_n]$

- a. Input i which represents i^{th} position of array X.

Write a function *int maxSetBit(x_i)* that returns a number that contain maximum number of SET bits in the range from 1 to x_i . If more than one number contain same SET bit pattern return the smallest number.

Print the *maxSetBit(x_i)*

Input Format:

User should enter the size of the array and elements in the array. Then position i to represent i^{th} element of array X whose *maxSetBit* to be displayed

Output Format

prints a number that is the return value of *maxSetBit(x_i)*

Sample Testcases

Input:

Size of array:3

Elements of array:

5

11

13

Position of the element in the array whose maxSetBit to found:2

Output:

7

Input:

Size of array:1

Elements of array:

99

Position of the element in the array whose maxSetBit to found:1

Output:

63

- b. Your target is finding a pair of integers x_u, x_v ($1 \leq u < v \leq N$) such that $(x_u \text{ AND } x_v)$ is as large(big) as possible. AND is a bit-wise operation which is corresponding to &

Input Format :

The first line of the input contains a single integer N. The next line

contains the x_i .

Output Format:

Contains a single integer x_u which is the largest value of x_u AND x_v where $1 \leq u < v \leq N$.

Sample Testcases

Input:

4

2 4 8 10

Output:

8

Explanation

2 AND 4 = 0

2 AND 8 = 0

2 AND 10 = 2

4 AND 8 = 0

4 AND 10 = 0

8 AND 10 = 8

2.

a.

Ashoka, as you all know was one of the greatest warriors of his time. The emperor of the Maurya Dynasty had never lost a battle under him, and the reason for that was their really powerful army, also called as Mahasena. Ashoka was known to be a very superstitious person. He believed that a soldier is "lucky" if the soldier is holding an even number of weapons, and "unlucky" otherwise. He considered the army as "READY FOR BATTLE" if the count of "lucky" soldiers is strictly greater than the count of "unlucky" soldiers, and "NOT READY" otherwise. Given the number of weapons each soldier is holding, your task is to determine whether the army formed by all these soldiers is "READY FOR BATTLE" or "NOT READY".

Input Format:

The first line of the input contains a single integer N , the number of soldiers. The next line contains the number of weapons of each soldier..

Output Format:

A string should be the output based on the readiness of the army formed by the soldiers

Sample Testcases

Input:

1

1

Output:

NOT READY

Input:

4

11 12 13 14

Output:

NOT READY

Input:

3

2 3 4

Output:

READY FOR BATTLE

- b. Ashoka was also superstitious about the way he arranges his armoury. According to his orders each room contain different types of weapons in his armoury and none of the rooms are empty. The only rule were that each room should contain N numbers of weapons, where N should only be divisible by at most two numbers. If above condition satisfied then Ashoka will " PREPARE FOR WAR" otherwise "RE-ARRANGE AGAIN ".

Input format:

M is the number of room in his armoury.

N is number of weapons in each room.

Output format : If condition satisfied then output is " PREPARE FOR WAR" otherwise output is "RE-ARRANGE AGAIN ".

Sample Testcases

input: 3

127 181 84

output: RE-ARRANGE AGAIN

input: 4

281 449 911 601

output: PREPARE FOR WAR

3.

- a. In a company an employee is paid as under: If his basic salary is less than Rs. 1500, then HRA = 10% of basic salary and DA = 90% of basic salary. If his salary is either equal to or above Rs. 1500, then HRA = Rs. 500 and DA = 98% of basic salary. If the Employee's basic salary is input,

Write a function *ComputeTotalSalary(basic_salary)*
using call by value to find his gross salary.

Sample Testcases

input :1200

output : 2400.00

input : 10042

output : 20383.16

- b. Company organizes a game for its n employee and winner got a price in form of increment in his salary. In this game employee are standing in a circle and numbered consecutively clockwise from 1 to n . Starting with employee no. 2, every employee eliminates your second position (next to next) employee, until only single employee is remaining that is the winner of the game. (elimination also considered as clockwise direction). For example, if $n = 6$, the employee are removed in the order 2, 4, 6, 3, 1, and the last employee remaining is no. 5 that is winner.

Write a function, *int WinningFunctionOfGame(n)* to get the winner of the game.

Find some simple way to compute *WinningFunctionOfGame(n)* using call by value for any positive integer $n > 1$.

Sample Testcases

input : $n=8$

output : employee at number-1 is winner

input : $n=10$

output : employee at number-5 is winner.

4. Given a positive integer N , perform following operation:
- a. Write a function *int SmallestIntegerForMultipleOf10(N)* using call by value that takes N as input and return minimum operation required to make N to multiple of 10, if we can apply only one operation that is "multiply by 2". For example: for $N=15$, we need multiplication operation only one time ($2*15$) to make it multiple of 10.

Sample Testcases

input : $N= 15$

output : 1

input : $N= 10$

output : 0

input : $N=9$

output : Not Possible

- b. $N > 2$, with prime factorization:

$$K = p_1^{a_1} * p_2^{a_2} \dots * p_n^{a_n}$$

Write a function *int SumOfProducts(K)* to compute the following expression using call by value method.

$$S = a_1 * p_1 + a_2 * p_2 \dots + a_n * p_n.$$

Sample Testcases

input : 6

output : 5

input : 7
output : 7