

Foundations of Algorithms – IE2072

Sri Lanka Institute of Information Technology Assignment (30% of total assessments)

Due Date: 14th May 2022

Develop **C** or **Java** source codes for the following applications.

Question 1 (10 marks)

Bob is writing a program that solves the following problem:

You are given the numbers a, b to display the infinite sequence of numbers $a, a+b, a+2*b \dots, a+N*b, a+(N+1)*b, \dots$. Bob has made a mistake, he namely forgot to draw a space for the separation between the numbers, resulting in a long line of numbers. In order not to correct the mistake, Bob decided to find out how to find the k^{th} digit in the formed line (numbering of digits begins with one).

Bob could not find a good solution, so he asks you for help.

Input format

- The first line contains a number T denoting the number of tests.
- The first line of each test contains four integers a, b, k .

Output format

Print the k^{th} digit for each test.

Ex:

Sample Input	Sample Output
2	2
3 5 9	7
2 7 10	

Question 2 (20 marks)

You are given N cities and the i^{th} city contains $a[i]$ blocks. If you want to build a road between i^{th} and j^{th} cities ($i \neq j$), then the number of blocks needed is $gcd(a[i], a[j])$. Here gcd is the greatest common divisor. You have to build roads in such a way that any person can go from any city to another city in exactly one way, not more than one way between two cities. You have to maximize the total number of blocks used to build roads.

Input format

- The first line contains N denoting the number of cities.
- The second line contains N integers, $a[1], a[2], \dots, a[N]$ where $a[i]$ is the number of blocks in the i^{th} city.

Output format

Print a maximum number of blocks used to build roads in such a way the provided condition is satisfied.

Ex:

Sample Input	Sample Output
3	5
4 6 9	

Submit your **original source codes** and the **document which contains the source codes and screenshots of the outputs**.

The link will be available in courseweb on or before the deadline mentioned.

Copied source codes will get 0 mark without any clarifications.

The absence for the viva session (will be scheduled after the deadline) will also get 0 marks.