July 2023 CSE 102

Offline 2 on Loops

Full Marks: 20

Playing with Numbers

Problem Statement:

Let's think you are playing with numbers. You have been given a set of integers as "candidate numbers" and an integer as a "query number". Now, count the number of 1s (1s count value) in the binary representations of all the candidate and query numbers. Then, you have to figure out two numbers from the candidate numbers' set-

I. One number's "1s count value" must have a minimum difference from the "1s count value" of the query number.

II. Another number's "1s count value" must have a maximum difference from the "1s count value" of the query number.

If you find multiple candidate numbers with minimum differences, choose the lowest number among them. Again, if multiple numbers can be identified with maximum differences, consider the highest number among them.

Input:

Take an integer n ($1 \leq n \leq 1000$) as input, representing the total test cases.
Each case starts with a positive integer k ($1 \leq k < 4,294,967,296$) indicating the query number and an integer m ($3 \leq m \leq 10000$) representing how many integer numbers are in the set of "candidate numbers". The next line contains m positive integer numbers separated by white spaces. Those integers represent the elements of the candidate numbers' set, and each number will be between 1 and 4,294,967,295.

Output:

Output should be organized as in the sample shown on the next page. For each test case, you must show the case number at the beginning. Then, *(m+1)* lines will show the binary representations of the candidate numbers and the query number in 32 bits. Finally, print two desired numbers (stated in the "Problem Statement" section) as output.

Restrictions:

You cannot use one/multi-dimensional arrays or any other data structures. You also cannot call any self-implemented or built-in functions (except scanf and printf).

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Sample Inputs/Outputs:

Input	Output
2 7 3 1 2 3 8 5 1 2 4 8 16	Case 1 00000000000000000000000000000001 00000000000000000000000000000010 00000000000000000000000000000011 00000000000000000000000000000111 Number with Minimum Difference: 3 Number with Maximum Difference: 2 Case 2 00000000000000000000000000000001 00000000000000000000000000000010 00000000000000000000000000000100 00000000000000000000000000001000 00000000000000000000000000010000 00000000000000000000000000001000 Number with Minimum Difference: 1 Number with Maximum Difference: 16
1 255 10 23 12 323 33 29 123 89 45 84 100	Case 1 00000000000000000000000000010111 00000000000000000000000000001100 00000000000000000000000101000011 00000000000000000000000000100001 00000000000000000000000000011101 00000000000000000000000001111011 00000000000000000000000001011001 00000000000000000000000000101101 00000000000000000000000001010100 00000000000000000000000001100100 00000000000000000000000011111111 Number with Minimum Difference: 123 Number with Maximum Difference: 33

Submission Guidelines:

- ➔ Solve the problem and rename the file as <your_id>_2.c (Example: student with ID 2205999 will rename it as 2205999_2.c).
- ➔ Then upload the .c file in Moodle.
- ➔ **Deadline: January 05, 2024 (Friday) 10:00 PM.**
- ➔ **Do not copy from your classmate. In this case both of you will get -100%. Also do not copy code from any website or ChatGPT. You will get -200% in this case.**

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