



SERIAL NUMBER

COURSE WORK #05

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PROBLEM STATEMENT

A consumer electronics production company marks each new mobile phone by serial number calculated following the formula:

$(X_0 * A + X_1 * A^2 + X_2 * A^3 + X_3 * A^4 + X_4 * A^5 + X_5 * A^6) \bmod B$ where

X_0 — year ($2000 \leq X_0 \leq 3000$), X_1 — month ($1 \leq X_0 \leq 12$) , X_2 — day ($1 \leq X_0 \leq 31$), X_3 — hour ($0 \leq X_0 \leq 23$), X_4 — minute ($0 \leq X_0 \leq 59$), X_5 — second ($0 \leq X_0 \leq 59$), A — the constant ($10 \leq A \leq 10^9$), B — $10^9 + 7$.

All phones produced on 24.09.2015 have the wrong firmware. You need to find the serial numbers of phones produced on 24.09.2015 in the list and compute their count.

PROBLEM STATEMENT

Input. The first string contains two numbers: constant **A** and count of the serial numbers **N** ($10 \leq N \leq 10^6$) divided by spaces. The second string contains **N** serial numbers divided by spaces.

Output. The count of the mobile phones produced on 24.09.2015.

Example. **A** = 13 and **N** = 2

Input:

13 2

183099332 183099333

Output: 1 ($183099332 = (2015 * 13 + 9 * 13^2 + 24 * 13^3 + 12 * 13^4 + 11 * 13^5 + 37 * 13^6) \% (10^9 + 7)$)

THE PROBLEM SOLVING

We can not do the reverse calculating and restore the date based on the serial number. So, this way is not possible.

To solve this problem we need to compute each possible serial number for phones produced on 24.09.2015. We have already fixed 3 of 6 formula addends. For this particular day, we have 24 hours. Each hour has 60 minutes and each minute has 60 seconds. Thus, in total, we have $24 * 60 * 60 = 86400$ different serial numbers. All we need to do is generate all these serial numbers and store them in the array for further searching. Then we will read serial numbers from the input and search them in the array.

THE PROBLEM SOLVING

The algorithm to solve this problem.

1. Generate 86400 serial numbers for 24.08.2015 and store them in the array.
2. Read serial numbers from the input and search in the array. If serial number is found then increase the answer.

Note. Be careful with large numbers!

The image features a dark gray background with a subtle pattern of concentric circles. In the four corners, there are white line-art illustrations of circuit boards or neural network connections, consisting of lines and small circles.

**THANK
YOU!**