GCD

You are given a sequence of N integers $A[1], A[2], \ldots, A[N]$. You are also given an integer K and an integer V.

Let $\gcd(X_1, X_2, \cdots, X_k)$ denote the greatest common divisor of the integers $X_1, X_2, \ldots, X_k$. For example, $\gcd(14, 21) = 7$, $\gcd(4, 8, 15) = 1$.

We define $f_{l,r}(x) = \gcd(A[1], A[2], \ldots, A[l], A[r], A[r+1], \ldots, A[N])^k \oplus x$, where $\oplus$ denotes the bitwise XOR operation. Your task is to calculate the sum:

$$\left(\sum_{x=0}^{V} \sum_{l=1}^{N} \sum_{r=l+1}^{N} f_{l,r}(x) \cdot (A[l] + A[r]) \right) \bmod 998\,244\,353$$

Implementation Details

You need to implement one procedure called `calculate_sum`:

```
int32 calculate_sum(int32 N, int32 K, int32 V, int32[] A);
```

- N: the number of integers in the sequence;
- K: the exponent;
- V: the maximum value of x;
- A: the sequence of integers;
- This procedure might be called no more than 100 times for each test case at the beginning of the program.

The procedure should return the sum modulo $998\,244\,353$:

$$\left(\sum_{x=0}^{V} \sum_{l=1}^{N} \sum_{r=l+1}^{N} f_{l,r}(x) \cdot (A[l] + A[r]) \right) \bmod 998\,244\,353$$

Constraints

- $1 \leq N \leq 5 \times 10^5$
- $0 \leq K \leq 100$
- $0 \leq V \leq 10^9$
- $1 \leq A[i] \leq 10^9$ for each $i = 1 \ldots N$.

Scoring

1. Subtask 1 (4 points): $N = 1$, $K = 1$
2. Subtask 2 (8 points): $N \leq 100$, $K \leq 2$, $V \leq 100$
3. Subtask 3 (15 points): $N \leq 100$, $K \leq 100$, $V \leq 100$
4. Subtask 4 (11 points): $N \leq 10^5$, $K = 0$
5. Subtask 5 (17 points): $N \leq 10^5$, $V = 0$
6. Subtask 6 (21 points): $N \leq 10^5$, $K \leq 2$
7. Subtask 7 (11 points): $N \leq 10^5$
8. Subtask 8 (13 points): No additional constraints.

Examples

Example 1

Consider the following call.

```
calculate_sum(3, 2, 3, [3, 6, 2]);
```

The procedure should return 132.

Example 2

Consider the following call.

```
calculate_sum(7, 1, 0, [1, 2, 3, 4, 5, 6, 7]);
```

The procedure should return 168.

Sample Grader

The sample grader reads the input in the following format:

- Line 1: Three integers N, K, and V
- Line 2: N integers $A[1], A[2], \ldots, A[N]$

The sample grader calls `calculate_sum(N, K, V, A)` and prints the returned value.