Assignment X
Lab MC504

Q1.

Suppose you have a mirror cutting business. You have a mirror of length 8, and you want to cut up the mirror and sell the pieces in a way that maximizes the total amount of money you get. Write a program to calculate the maximum total amount of money you earn.
A piece of length i is price p in rupees that is given in the following table :

Length i	1	2	3	4	5	6	7	8
Price p	1	5	8	9	10	17	17	20

Input:
array1=[1,2,3,4,5,6,7,8]
array2=[1,5,8,9,10,17,17,20]
Output: 22

Q2

Let's consider some array A. The following algorithm calculates it's force:

1. Find all the continuous blocks where all the elements of A are equal.
2. Calculate sum of squared lengths of these blocks.

For example if array **A = {2, 3, 3, 1, 1, 1, 4, 2, 2}** its force will be $1^2 + 2^2 + 3^2 + 1^2 + 2^2 = 19$

We can reorder some elements and get array with greater force. In the example above we can move the first element of **A** to the end and get array **A = {3, 3, 1, 1, 1, 4, 2, 2, 2}** with force $2^2 + 3^2 + 1^2 + 3^2 = 23$.

You are given an array. What is the maximum force you can get by reordering some of its elements?

Input

The first line contains integer **T** denoting the number of test cases. The following **T** lines contain **4** integers each: **A[0], A[1], N, MOD**.

Array **A** of **N** elements is generated by the following way:

- **A[0], A[1] are given**
- **A[i] = (A[i - 1] + A[i - 2]) modulo MOD** for **1 < i < N**.

Output

For each test case output one integer on the separate line - answer for the question.

Constraints

- **1 <= T <=100**
- **0 <= A[0], A[1] <= 10^6**
- **2 <= N <= 10^6**
- **max(A[0] , A[1]) < MOD < 10^6**

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Sample Input:-	**Sample Output**
2	12
0 1 6 4	10
1 1 4 2	

Explanation

Test case 1: array A = {0, 1, 1, 2, 3, 1}. The greatest possible force will be with the reordering {2, 0, 1, 1, 1, 3}

Test case 2: array A = {1, 1, 0, 1}. The greatest possible force will be with the reordering {1, 1, 1, 0}

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