Recurrence Power Sum

You are given a series defined by the following recurrence:

$f_0 = x, f_1 = y$

$f_n = a * f_{n-1} + b * f_{n-2}$

You are required to find the summation of the following series:

$f_0^k + f_1^k + f_2^k + ... + f_n^k$

The values **a**, **b**, **x**, **y**, **n**, **k** will be provided. Since the answer can be large, output it modulo **1000000007**.

Input

The first line contains a single integer **T** denoting the number of test cases. Each test case consists of **six** space separated integers on a single line, in the order: **a**, **b**, **x**, **y, n, k**.

Output

For each test case, output a single integer (on a separate line) denoting the summation of the series as mentioned above.

Constraints

$1 \le T \le 500$

$0 \le a, b \le 100$

$0 \le x, y \le 10^9$

$0 \le n \le 10^{15}$

$0 \le k \le 1000$

Example

Input:
5
1 1 0 1 3 0
1 1 0 1 3 1
1 1 0 1 4 2
1 1 0 1 4 3

Output:
4
4
15
37

Explanation

In all the sample test cases, $\mathbf{f_0 = 0, f_1 = 1, f_n = f_{n-1} + f_{n-2}}$, which is the regular **Fibonacci** series. The first few terms of the sequence are **0, 1, 1, 2, 3, 5, ...**

- For the first case, the required sum is $\mathbf{0^0 + 1^0 + 1^0 + 2^0 = 4.}$
- For the second case, the required sum is $\mathbf{0^1 + 1^1 + 1^1 + 2^1 = 4}$.
- For the third case, the required sum is $\mathbf{0^2 + 1^2 + 1^2 + 2^2 + 3^2 = 15}$.
- For the fourth case, the required sum is $\mathbf{0^3 + 1^3 + 1^3 + 2^3 + 3^3 = 37}$.

Note: Time limit is set leniently to allow slow languages to pass.