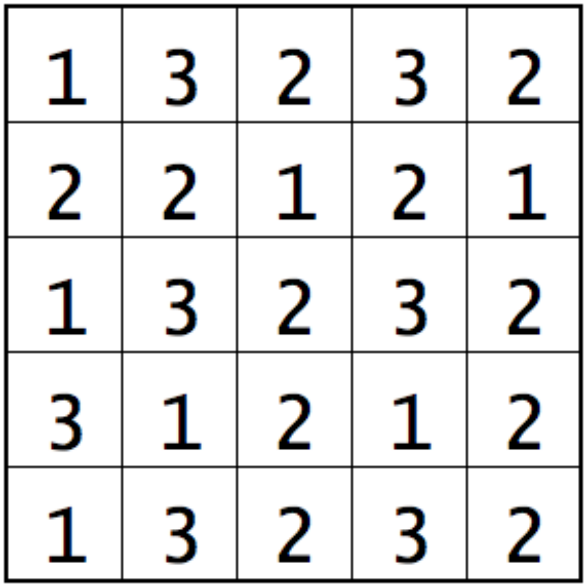
2x2 Subgrid Sum Problem (generalized)

This problem is a higher constraints and generalized version of KWACIK (Polish) and GRIDSUM2.



You are given a ***k***x***k*** grid. You can place an integer m ($\boldsymbol{a} \le m \le \boldsymbol{b}$) in each cell.

How many ways are there to place integers in the cells such that the sum of each 2x2 subgrid is ***n*** ?

Since the answer might be very large, output it modulo **479001600** (= **12!**).

Input

The first line contains an integer ***T*** ($1 \le \boldsymbol{T} \le 10^4$), the number of test cases.

On each of the next ***T*** lines, you are given four integers ***k***, ***a***, ***b*** and ***n***.

($2 \le \boldsymbol{k} \le 5$, $0 \le \boldsymbol{a} \le \boldsymbol{b} \le 5 * 10^8$, $0 \le \boldsymbol{n} \le 2 * 10^9$)

Output

For each test case, output a single line containing the number of ways to place integers modulo **479001600** (= **12!**).

Example

Input:

```
4
2 1 2 4
3 1 2 5
4 1 3 6
```

5 1 3 8

Output:

1
8
74
1383

Explanation

There are 8 ways to place integers for ***k***=3, ***a***=1, ***b***=2 and ***n***=5.

2 1 2 : 2 1 2 : 2 1 1 : 1 2 1 : 1 2 1 : 1 1 2 : 1 1 1 : 1 1 1
1 1 1 : 1 1 1 : 1 1 2 : 1 1 1 : 1 1 1 : 2 1 1 : 2 1 2 : 1 2 1
2 1 2 : 1 2 1 : 2 1 1 : 2 1 2 : 1 2 1 : 1 1 2 : 1 1 1 : 1 1 1

Credit & Special thanks

- Bartek - the original problem author
- Mitch Schwartz