Midterm 1 - ICT20211 - 0606

A. SSUM

1 second, 256 megabytes

Given $f(n) = \sum_{i=1}^{n} i$. Calculate the value of $S = (\sum_{i=1}^{n} f(i)) \ mod \ m$.

Input

The first line contains a single integer $T (1 \leq T \leq 10)$ — the number of test cases.

Each test case consists of a single line that contains two integers n and m $(1 \leq n, m \leq 10^{18})$.

Output

For each test case print one integer — the value of the S.

input
2 2 10 122 1000
output
4 124

Subtask 1 (30%) : $n, m \leq 10^4$.

Subtask 2 (40%) : $n, m \leq 10^9$.

Subtask 3 (30%) : No additional contraints.

B. K-Bracket

1 second, 256 megabytes

Given string S of length n (n is even) consisting of characters from the set $\{'(', ')', '?'\}$.

Find the number of ways to replace $?$ with other characters to obtain a parenthesis string with nesting depth less than or equal to k. A parenthesis string with nesting depth k is defined as follows:

- Empty string depth is 0.
- If A's depth is a, If B's depth is b then: (A)'s depth is $a + 1$. AB's depth is $max(a, b)$.

Input

- First line contains two integers n and k.
- Second line contains S.

Output

A single integer — the number of ways

input
4 1 ?)??
output
1

input
8 3 ?(??)?()
output
2

Subtask 1 (60%): $n \leq 20$

Subtask 2 (40%): $n \leq 30, k \leq 3$

C. Tours

1 s., 256 MB

There are N cities. The distance between city i and city j is $c(i,j), \forall i,j \in \{1,\ldots,N\}$. A tour is define to be a permutation $x_1, x_2, \ldots, x_N$ of 1, 2,...,N (in which x_1 is always fixed by 1) and its length is defined to be $c(x_1,x_2) + c(x_2,x_3) + \cdots + c(x_{N-1},x_N) + c(x_N,x_1)$. Given a positive integer M. Compute how many tours whose length is less than or equal to M.

Input

The input consists of following lines:

- Line 1 contains N và M ($1 \leq N \leq 15, 1 \leq M \leq 1000000$).
- Line $i+1 (\forall i = 1,\ldots,N)$ contains i^{th} of the matrix c

Output

Write the number of tours whose length is less than or equal to M.

input
4 10 0 1 2 6 1 0 5 4 2 5 0 3 6 4 3 0

output
2