

Problem I. Stirling Number

Input file: *standard input*
Output file: *standard output*
Time limit: 9 seconds
Memory limit: 256 mebibytes

The Stirling number of the first kind $\begin{bmatrix} n \\ k \end{bmatrix}$ is the number of permutations of n elements with exactly k disjoint cycles. The well-known recurrence relation is defined as follows:

$$\begin{bmatrix} n+1 \\ k \end{bmatrix} = n \begin{bmatrix} n \\ k \end{bmatrix} + \begin{bmatrix} n \\ k-1 \end{bmatrix}$$

for $k > 0$, with the initial conditions

$$\begin{bmatrix} 0 \\ 0 \end{bmatrix} = 1 \quad \text{and} \quad \begin{bmatrix} n \\ 0 \end{bmatrix} = \begin{bmatrix} 0 \\ n \end{bmatrix} = 0$$

for $n > 0$.

Given four integers, n , l , r , and p , find the value of

$$\left(\sum_{k=l}^r \begin{bmatrix} n \\ k \end{bmatrix} \right) \bmod p$$

where p is prime.

Input

The first line contains four integers, n , l , r , and p ($1 \leq n \leq 10^{18}$, $0 \leq l \leq r \leq n$, $2 \leq p \leq 10^6$, p is prime).

Output

Output an integer denoting the answer.

Examples

standard input	standard output
4 1 4 5	4
6 5 5 29	15
1000 685 975 999983	482808