

Problem I. Infinite String

Input file: *standard input*
Output file: *standard output*
Time limit: 1.5 seconds
Memory limit: 256 mebibytes

Given an infinite periodic binary string S with index counting from 0. That means $S = TTTT\dots$, where T is the period of string S . For example, $T = 101$, then $S = 101101101101\dots$

$S[l, r]$ is the sub-string of S . We define $f[l, r]$ is the value when regarding $S[l, r]$ as a binary number.

Please count the number of binary strings T with length k , where T is the period of string S , satisfying the condition: $f[l, r] = x \pmod p$.

The number can be very large, just output the number modulo $10^9 + 7$.

Input

There are no more than 162 test cases, terminated by a line with five zeroes.

For each test case, there is a line contains five numbers p ($2 < p < 10^{18}$, p is a prime number), x ($0 \leq x < p$), l, r ($0 \leq l \leq r \leq 10^{18}$) and k ($1 \leq k \leq 10^{18}$).

Output

For each test case, print the answer modulo $10^9 + 7$.

Examples

standard input	standard output
3 0 1 2 1	2
233 23 2333 23333 23	36003
233 1 1 2 23	2097152
0 0 0 0 0	