

K-th smallest number

Given an array of (pseudo) random numbers generated by the C++ function below, your task is to find the K-th smallest number of all the numbers.

```
unsigned array[5000000];

void randomize(unsigned a,unsigned b,unsigned mod)
{
    for( int i=0 ; i<5000000 ; i++ )
    {
        a = 31014 * (a & 65535) + (a >> 16);
        b = 17508 * (b & 65535) + (b >> 16);
        array[i] = ((a << 16) + b) % mod;
    }
}
```

Note that the computation might overflow, but we only care about the last 32 bit of each result so it doesn't matter.

Input

One line with 4 numbers (a, b, mod, K) separated by space.

$$0 \leq a, b \leq 65535$$

$$2 \leq \text{mod} \leq 2^{32}-1$$

$$1 \leq K \leq 5 \times 10^6$$

Output

K-th smallest number of all the generated numbers.

Example

Input:

2 3 100000007 23

Output:

434