Problem B. One More Problem About DFT

Input file:	*standard input*
Output file:	*standard output*
Time limit:	5 seconds
Memory limit:	512 mebibytes

Let p be a prime number and $a = (a_0, a_1, \ldots, a_{n-1})$ be an array of n integers, where $p = Kn + 1$ for some positive integer K. We say that the array $\hat{a} = (\hat{a}_0, \hat{a}_1, \ldots, \hat{a}_{n-1})$ is the *Discrete Fourier Transform* of the array a if for every $k = 0, 1, \ldots, n-1$ the following holds:

$$\hat{a}_k = \left(\sum_{j=0}^{n-1} a_j w^{jk} \right) \bmod p$$

and we simply write $\hat{a} = \mathrm{DFT}(a)$. Here w denotes a primitive n-th root of unity modulo p, that is, we have $w^n \equiv 1 \pmod p$ and, for every i such that $0 < i < n$, $w^i \not\equiv 1 \pmod p$.

Note that there can be multiple choices for w, so the DFT won't be unique. Let us clarify how to uniquely find it for this problem. Let g be a generator modulo p, that is, for every x such that $0 < x < p$, there exists a positive integer r such that $0 \le r < p-1$ and $x = g^r \bmod p$. You can find the smallest positive value for g that works and choose $w = g^K \bmod p$.

Now we define $\mathrm{DFT}^{(m)}(a) = \underbrace{\mathrm{DFT}(\mathrm{DFT}(\ldots \mathrm{DFT}(a) \ldots))}_{m \text{ times}}$, so your task is just to find $\mathrm{DFT}^{(m)}(a)$.

Input

The first line contains three space-separated integers: n ($2 \le n \le 3 \cdot 10^5$), p ($5 \le p \le 10^9{+}7$), and m ($0 \le m \le 10^{18}$), the parameters of the problem described above. It is guaranteed that p is prime and that n divides $p-1$ evenly.

The second line contains n space-separated integers $a_0, a_1, \ldots, a_{n-1}$ ($0 \le a_i < p$), the array a.

Output

Output n space-separated integers $a'_0, a'_1, \ldots, a'_{n-1}$, the resulting array after doing the operation stated in the problem.

Example

standard input	standard output
6 61 4 24 17 39 52 25 7	10 2 1 42 46 8

Note

In the sample test case, the smallest possible generator for $p = 61$ is $g = 2$. We have that $K = \frac{61-1}{6} = 10$, so we choose $w = 2^{10} \bmod 61 = 48$ to be the primitive 6-th root of unity modulo 61. The first iterations of the DFT are as follows:

- $\mathrm{DFT}^{(0)}(a) = (24, 17, 39, 52, 25, 7)$
- $\mathrm{DFT}^{(1)}(a) = (42, 55, 25, 12, 39, 32)$
- $\mathrm{DFT}^{(2)}(a) = (22, 42, 28, 7, 51, 41)$
- $\mathrm{DFT}^{(3)}(a) = (8, 9, 51, 11, 28, 25)$
- $\mathrm{DFT}^{(4)}(a) = (10, 2, 1, 42, 46, 8)$