Fibonacci vs Polynomial (HARD)

Define a sequence *Pib*(n) as following

- *Pib*(0) = 1
- *Pib*(1) = 1
- otherwise, *Pib*(n) = *Pib*(n-1) + *Pib*(n-2) + **P**(n)

Here **P** is a polynomial.

Given **n** and **P**, find *Pib*(n) modulo 1,111,111,111.

Maybe you should solve PIBO before this task, it has lower constraints.

Input

First line of input contains two integer **n** and **d** ($0 \le \mathbf{n} \le 10^9$, $0 \le \mathbf{d} \le 10000$), **d** is the degree of polynomial.

The second line contains **d**+1 integers $\mathbf{c}_0, \mathbf{c}_1 \ldots \mathbf{c}_d$, represent the coefficient of the polynomial (Thus **P**(x) can be written as $\Sigma \mathbf{c}_i x^i$). $0 \le \mathbf{c}_i < 1{,}111{,}111{,}111$ and $\mathbf{c}_d \ne 0$ unless d = 0.

Output

A single integer represents the answer.

Example

Input:
10 0
0

Output:
89

Input:
10 0
1

Output:
177

Input:
100 1
1 1

Output:
343742333