

## 4 Pseudo Random Numbers

Martha and Goldie are excited to have been accepted as players on a game show where they get to choose briefcases with money in them and accept or deny the offer made to them by the host.

Practicing for the show, they are creating a computer program to help them play the game many times to understand the probabilities involved. They have most of the program planned, but they need a pseudo-random number generator.

A pseudo-random number generator is used to create a sequence of numbers that appear to have the properties of actual random numbers. The usual process is to start with an initial number, called the seed, and apply a mathematical transformation to generate the next number. Then the same transformation is used on the second number, generating another.

Early in the days of electronic computers, the middle-square method was used to generate pseudo-random numbers. In this method the seed number is squared and the middle digits of the square are extracted as the next number in the sequence.

For example, for 4 digit numbers, and a seed of 5234, the square is 27394756, an 8 digit number. The middle 4 digits are 3947, the next number. The following number in the sequence is 5788. If the squared number doesn't have enough digits, then add 0s on the left until it does. For example, if the seed is 0763, then the squared number is 582169. We add two 0s on the left to get 00582169, and the next number is 5821.

Help Martha and Goldie generate pseudo-random numbers for their program, using the middle-square method.

The input will contain 3 lines, with one number per line. The first number,  $N$ , is the number of digits that you want to have in your newly created pseudo-random numbers.  $N$  will be an even number in the range  $2 \leq N \leq 8$ . The second number,  $1 \leq M \leq 1000$ , is the number of pseudo-random numbers you need to generate. The third number,  $S$ , is the seed number.

The output will contain  $M$  lines, with one number per line, in the order created using the middle-square method. The first output number is the first number after the input seed. If the output number has leading 0 digits, do not display them. If the output number is 0, do display it.

Note: The  $\leftarrow$  symbol in the examples below represents a newline character.

### Sample Input

```
4←  
5←  
5234←
```

### Sample Output

```
3947←  
5788←  
5009←  
900←  
8100←
```

### Sample Input

2↵  
4↵  
62↵

### Sample Output

84↵  
5↵  
2↵  
0↵