

Project Euler #92: Square digit chains



This problem is a programming version of [Problem 92](#) from [projecteuler.net](#)

A number chain is created by continuously adding the square of the digits in a number to form a new number until it has been seen before.

For example,

$44 \rightarrow 32 \rightarrow 13 \rightarrow 10 \rightarrow 1 \rightarrow 1$

$85 \rightarrow 89 \rightarrow 145 \rightarrow 42 \rightarrow 20 \rightarrow 4 \rightarrow 16 \rightarrow 37 \rightarrow 58 \rightarrow 89$

Therefore any chain that arrives at **1** or **89** will become stuck in an endless loop. What is most amazing is that EVERY starting number will eventually arrive at **1** or **89**.

How many starting numbers below 10^K will arrive at **89**? As the result can be large, print modulo $(10^9 + 7)$

Input Format

First and only line contains K .

Constraints

$$1 \leq K \leq 200$$

Output Format

Print the required answer.

Sample Input

1

Sample Output

7