## ALGORITHM DESIGN TERM PROJECT

## 1206 - SUM OF DIGITS OF THE SUM OF NUMBERS

Time limit: 1.0 second Memory limit: 64 MB

## INTRODUCTION

Let us denote the sum of digits of the number $N$ by $S(N)$. In this problem, we want you to determine, how often the following equality holds:

$$
S(A+B)=S(A)+S(B)
$$

## PROBLEM

## - Input

- The input contains a single integer $K, 2 \leq K \leq 50$.


## - Output

- You should output the number of pairs of $K$-digit numbers $A$ and $B$ to satisfy the above equality. Counting that number you should be aware of the following:
1.numbers $A$ and $B$ should not have leading zeroes;
2.while counting the total number of pairs, the order of numbers $A$ and $B$ matters, thus, for instance, (12, $26)$ and $(26,12)$ are different pairs that satisfy the conditions of the problem.

```
ans1 = 0
ans2 = 0
for i in range(1, 10) :
    for j in range[ (1, 1¢)] :
        if i + j< 10 :
        ans1 += 1
for i in range(0, 10) :
    for j in range(0, 10) :
        if i + j< 10 :
            ans2 += 1
n = int(input())
```

for $i$ in range ( $1, \mathrm{n}$ ) :
ans1 *= ans2
print(ans1)

## PROOF

| ID | Date | Author | Problem | Language | Judgementresult | Test\# | $\begin{aligned} & \text { Execution } \\ & \text { time } \end{aligned}$ | Memory |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 8657140 | 07:13:56 28 Nov 2019 | Shiv Dechasakphan | $\begin{aligned} & \text { 1206. Sum of Digits of the Sum of } \\ & \text { Numbers } \end{aligned}$ | Python 3.6 | Accepted |  | 0.093 | 268 KB |

## PROOF

- $S(A+B)=S(A)+S(B)$ is equal to that that for every pair of corresponding digits of $A$ and $B$ their sum is lower then 10 (1).
For example:
12 and $13: 1+1<10 ; 2+3<10$ it means $S(A+B)=S(A)+S(B)$
18 and 19: $8+9>10$ it means $S(A+B)=S(A)+S(B)$ is wrong here.
Then for every pair of digits from $A$ and $B$ you just count how many varints of pair suits (1) and multiply these quantities for all pairs.


## REFERENCE

- https://www.geeksforgeeks.org/program-for-sum-of-the-digits-of-a-given-number/
- https://acm.timus.ru/forum/?space=1\&num=1206

