Algorithmic problem solving

KAPREKAR NUMBER

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Kaprekar number

the original number, with the proviso that the part formed from the low-order digits of the square must be non-zero—although it is allowed to include *leading* zeroes t add up to

- In mathematics, a non-negative integer is called a "**Kaprekar number**" for a given base if the representation of its square in that base can be split into two parts that add up to the original number, with the proviso that the part formed from the low-order digits of the square must be non-zero—although it is allowed to include *leading* zeroes.
- For instance, 45 is a Kaprekar number, because $45^2 = 2025$ and $20 + 25 = 45$.
- The number 1 is Kaprekar in every base, because $1^2 = 01$ in any base, and $0 + 1 = 1$.
- Kaprekar numbers are named after D. R. Kaprekar.

Definition

- Let X be a non-negative integer and n a positive integer.
- X is an n-Kaprekar number for base b if there exist non-negative integer A, and positive integer B satisfying
- $X^2 = Ab^n + B$, where $0 < B < b^n$
- $X = A + B$

Algorithm to check if it is Kaprekar number or not.

C/C++ Implementation

```
#include <stdio.h>
#include <string.h>
#include <math.h>
#include <stdlib.h>

int main() {
    int p,q,c=0;
    scanf("%d",&p);
    scanf("%d",&q);
 int count = 0;
    for (long long i = p; i <= q; i++) {
        long long square = i * i;
        long long square_copy = square;
        int digCount = 0;
        while (square_copy) {
            square_copy /= 10;
            digCount++;
        }
```

```
        digCount += digCount%2;

        long long power = 10;
        for (long long k = 1; k < digCount/2; k++) {
            power *= 10;
        }
        long long r = square % power;
        long long l = square / power;
        if (r + l == i) {
          printf("%lld ", i);
          count++;
        }

    }

    if (count == 0) {
        printf("INVALID RANGE");
    }
    return 0;
}
```

REFERENCES

- https://en.wikipedia.org/wiki/Kaprekar_number
- https://www.geeksforgeeks.org/kaprekar-number/