The sum of the squares of the first ten natural numbers is,

$$1^2 + 2^2 + \ldots + 10^2 = 385$$

The square of the sum of the first ten natural numbers is,

$$(1 + 2 + \ldots + 10)^2 = 55^2 = 3025$$

Hence the difference between the sum of the squares of the first ten natural numbers and the square of the sum is 3025 − 385 = 2640.

Find the difference between the sum of the squares of the first one hundred natural numbers and the square of the sum.

If we list all the natural numbers below 10 that are multiples of 3 or 5, we get 3, 5, 6 and 9. The sum of these multiples is 23. Find the sum of all the multiples of 3 or 5 below 1000.

The four adjacent digits in the 1000-digit number that have the greatest product are 9 × 9 × 8 × 9 = 5832.

73167176531330624919225119674426574742355349194934
96983520312774506326239578318016984801869478851843
85861560789112949495459501737958331952853208805511
12540698747158523863050715693290963295227443043557
66896648950445244523161731856403098711121722383113
62229893423380308135336276614282806444486645238749
30358907296290491560440772390713810515859307960866
70172427121883998797908792274921901699720888093776
65727333001053367881220235421809751254540594752243
52584907711670556013604839586446706324415722155397
53697817977846174064955149290862569321978468622482
83972241375657056057490261407972968652414535100474
82166370484403199890008895243450658541227588666881
16427171479924442928230863465674813919123162824586
17866458359124566529476545682848912883142607690042
24219022671055626321111109370544217506941658960408
07198403850962455444362981230987879927244284909188
84580156166097919133875499200524063689912560717606
05886116467109405077541002256983155200055935729725
71636269561882670428252483600823257530420752963450

Find the seven adjacent digits in the 1000-digit number that have the greatest product. What is the value of this product?

*****************************STARTER HINT BELOW***********************************

```
a=7316717653133062491922511967442657474235534919493496983520312774506326239578318016984801869478
851843858615607891129494954595017379583319528532088055111254069874715852386305071569329096329522
744304355766896648950445244523161731856403098711121722383113622298934233803081353362766142828064
444866452387493035890729629049156044077239071381051585930796086670172427121883998797908792274921
901699720888093776657273330010533678812202354218097512545405947522435258490771167055601360483958
644670632441572215539753697817977846174064955149290862569321978468622482839722413756570560574902
614079729686524145351004748216637048440319989000889524345065854122758866688116427171479924442928
230863465674813919123162824586178664583591245665294765456828489128831426076900422421902267105562
632111110937054421750694165896040807198403850962455444362981230987879927244284909188845801561660
979191338754992005240636899125607176060588611646710940507754100225698315520005593572972571636269
56188267042825248360082325753042075296 3450
a = str(a)
listView = []
```

for digit in a: listView.append(int(digit)) print(listView)
The sum of the primes below 10 is 2 + 3 + 5 + 7 = 17. Find the sum of all the primes below two million.
Break my 4 digit password. Have the user enter a password and you try to brute force hack it. Basically, if they enter “ugly”, try “aaaa” then “aaab”.... You’ll get there eventually. Symbols, capitals, and numbers are all fair game.
Surprisingly there are only three numbers that can be written as the sum of fourth powers of their digits: $1634 = 1^4 + 6^4 + 3^4 + 4^4$ $8208 = 8^4 + 2^4 + 0^4 + 8^4$ $9474 = 9^4 + 4^4 + 7^4 + 4^4$ As $1 = 1^4$ is not a sum it is not included. The sum of these numbers is 1634 + 8208 + 9474 = 19316. Find the sum of all the numbers that can be written as the sum of fifth powers of their digits.
Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be: 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ... By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.
The following iterative sequence is defined for the set of positive integers: $n \rightarrow n/2$ (n is even) $n \rightarrow 3n + 1$ (n is odd) Using the rule above and starting with 13, we generate the following sequence: $13 \rightarrow 40 \rightarrow 20 \rightarrow 10 \rightarrow 5 \rightarrow 16 \rightarrow 8 \rightarrow 4 \rightarrow 2 \rightarrow 1$ It can be seen that this sequence (starting at 13 and finishing at 1) contains 10 terms. Although it has not been proved yet (Collatz Problem), it is thought that all starting numbers finish at 1. Which starting number, under one million, produces the longest chain? **NOTE:** Once the chain starts the terms are allowed to go above one million.