1295. Crazy Notions

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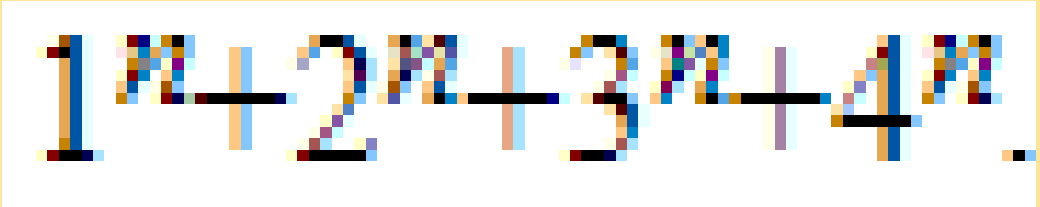


How much zeros does its decimal notation end with?

100 answer is 2

640 answer is 1

999 answer is 0

Input

The only line contains an integer n ($1 \le n \le 300000$).

Output

Output the number of zeroes the decimal notation of $1^n + 2^n + 3^n + 4^n$ ends with.

Samples

input	output
1	1
3	2

My first attempt

```python
n = input()

x = 1**int(n) + 2**int(n) + 3**int(n) + 4**int(n)

arr = list(str(x))

count = 0
for i in range(len(arr)-1,-1,-1):
    if arr[i] == '0':
        count += 1
    else:
        break

print(count)
```

Running Time of My first attempt

$$2^{**}n = \underbrace{2*2*2*.....2}_{n}$$

$$2^{**}n+3^{**}n+4^{**}n = 3n$$

```python
from time import time

n = 1000000

x = 2**n
y = 3**n

start = time()
print(x+y)

end = time()

print("time:",end-start)
```

2**n + 3**n

n = 1000000

```
3693857488739596486581827382834366177
0994272651830322995119308826895731497
4808787856885945721227821074988918067
77
time: 6.886989593505859
```

n = 100000

```
900770000600931379426158877713
2056377159230286829126520248741
8708296648121386958090580585864
3208534589119504601124248604755
time: 0.08600139617919922
```

Thank you for hint

Posted by **Md. Shahedul Islam (Shahed)** 13 Aug 2015 15:15

```
if {(1^n + 2^n + 3^n + 4^n) % 10} is equal to 0, then we find 1 zero.
if {(1^n + 2^n + 3^n + 4^n) % 100} is equal to 0, then we find 2 zeros.
and so on....

now, how to calculate {(1^n + 2^n + 3^n + 4^n) % 10}:

Look,
 {(1^n + 2^n + 3^n + 4^n) % 10}
=((1^n % 10) + (2^n % 10) + (3^n % 10) + (4^n % 10)) % 10   [simple modulo equivalencies]

now,
 (4^n % 10)
= ((((((4%10)*4)%10)*4)%10)*4)%10 . . . . . (n times)    [(4%10), then multiply by 4, then mod 10, loop for n times]
similarly for (2^n % 10) and (3^n % 10).   No need for 1, because (1^n % 10) is always 1.

In this way, calculate the rusult of {(1^n + 2^n + 3^n + 4^n) % m} for m = 10, 100, ans so on...  and count zeros... :)
```

```python
n = input()

cal1 = cal2 = cal3 = cal4 = 1

for i in range(int(n)):
    cal2 = (cal2*2)%100
    cal3 = (cal3*3)%100
    cal4 = (cal4*4)%100

x = cal1+cal2+cal3+cal4

arr = list(str(x))

count = 0
for i in range(len(arr)-1,-1,-1):
    if arr[i] == '0':
        count += 1
    else:
        break

print(count)
```

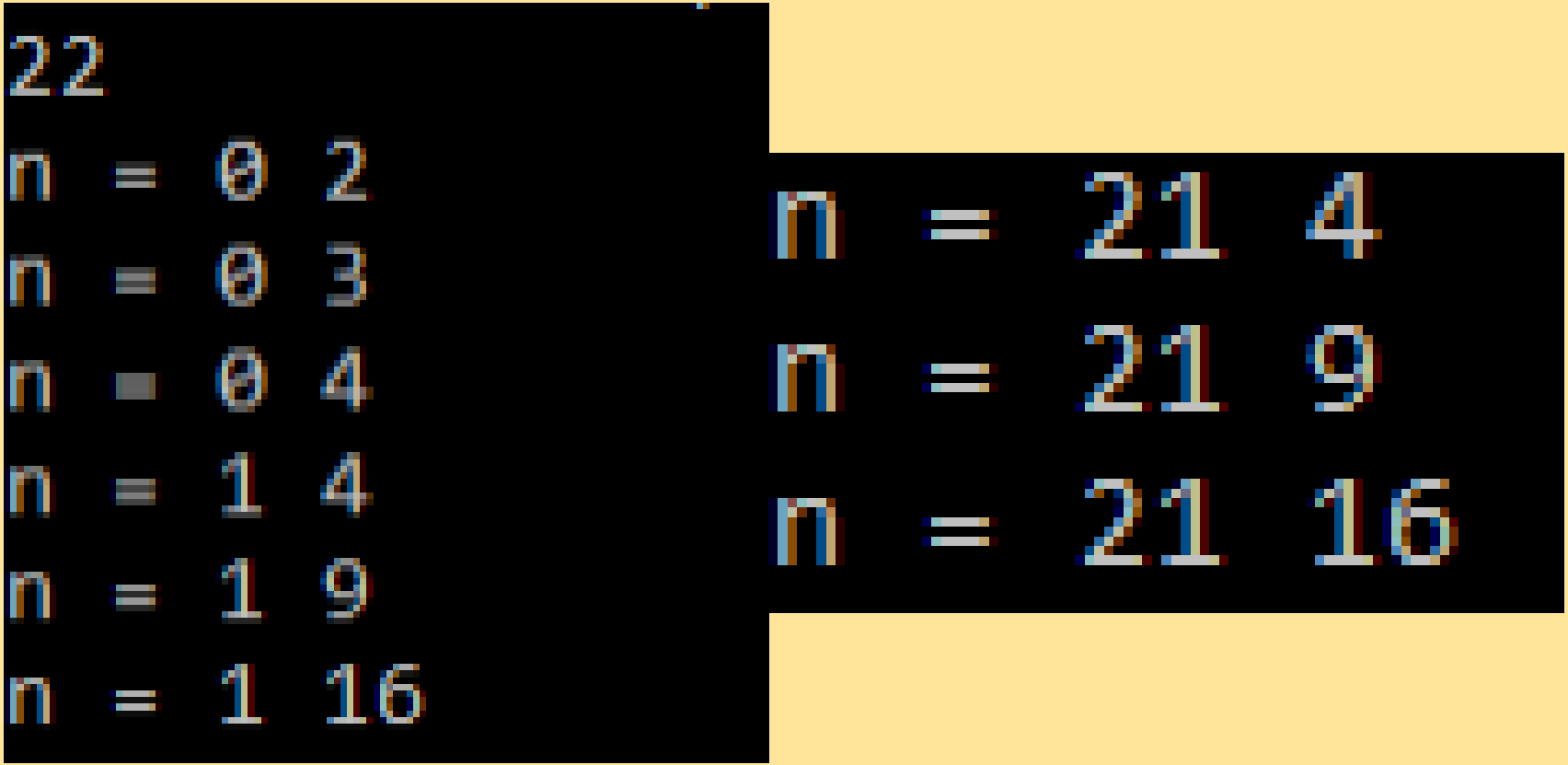
	Language	Judgement result	Test #	Execution time	Memory used
	Python 3.6	Accepted		0.327	304 KB

$2^{**}2 = 4$

$2^{**}22 = ...04$

$3^{**}1 = 3$

$3^{**}21 = ...03$


22
n = 0 2
n = 0 3
n = 0 4
n = 1 4
n = 1 9
n = 1 16
n = 21 4
n = 21 9
n = 21 16