

isHappy

2016 年 4 月 9 日

1 快乐数

写一个算法来判断一个数是不是“快乐数”。

一个数是不是快乐是这么定义的：对于一个正整数，每一次将该数替换为他每个位置上的数字的平方和，然后重复这个过程直到这个数变为 1，或是无限循环但始终变不到 1。如果可以变为 1，那么这个数就是快乐数。

样例 19 就是一个快乐数。

$$1^2 + 9^2 = 82 \quad 8^2 + 2^2 = 68 \quad 6^2 + 8^2 = 100 \quad 1^2 + 0^2 + 0^2 = 1$$

In [2]: `class Solution:`

```
# @param {int} n an integer
# @return {boolean} true if this is a happy number or false
def isHappy(self, n):
    # Write your code here
    # use set to store the result of sumSquare for detect number is in or not
    numSet = set()
    while n != 1:
        if n in numSet:
            return False
        numSet.add(n)
        n = self.sumSquare(n)
    return True

# @return sum of square for number's every bit
def sumSquare(self, num):
    sum = 0
    while num > 0:
        sum += (num % 10) * (num % 10)
        num /= 10
    return sum
```

```

sol = Solution()
for i in (1, 7, 10, 13, 19, 23, 28, 31, 32, 44, 49, 68, 70, 79, 82, 86, 91, 94, 97, 100,
        103, 109, 129, 130, 133, 139, 167, 176, 188, 190, 192, 193, 203, 208, 219, 226,
        230, 236, 239, 262, 263, 280, 291, 293, 301, 302, 310, 313, 319, 320, 326, 329,
        331, 338, 356, 362, 365, 367, 368, 376, 379, 383, 386, 391, 392, 397, 404, 409,
        440, 446, 464, 469, 478, 487, 490, 496, 536, 556, 563, 565, 566, 608, 617, 622,
        623, 632, 635, 637, 638, 644, 649, 653, 655, 656, 665, 671, 673, 680, 683, 694,
        700, 709, 716, 736, 739, 748, 761, 763, 784, 790, 793, 802, 806, 818, 820, 833,
        836, 847, 860, 863, 874, 881, 888, 899, 901, 904, 907, 910, 912, 913, 921, 923,
        931, 932, 937, 940, 946, 964, 970, 973, 989, 998, 1000):
    print i, " is Happy? ", sol.isHappy(i)
    print i+1, "is Happy? ", sol.isHappy(i+1)

1 is Happy? True
2 is Happy? False
7 is Happy? True
8 is Happy? False
10 is Happy? True
11 is Happy? False
13 is Happy? True
14 is Happy? False
19 is Happy? True
20 is Happy? False
23 is Happy? True
24 is Happy? False
28 is Happy? True
29 is Happy? False
31 is Happy? True
32 is Happy? True
32 is Happy? True
33 is Happy? False
44 is Happy? True
45 is Happy? False
49 is Happy? True
50 is Happy? False
68 is Happy? True
69 is Happy? False
70 is Happy? True
71 is Happy? False

```

```
79 is Happy? True
80 is Happy? False
82 is Happy? True
83 is Happy? False
86 is Happy? True
87 is Happy? False
91 is Happy? True
92 is Happy? False
94 is Happy? True
95 is Happy? False
97 is Happy? True
98 is Happy? False
100 is Happy? True
101 is Happy? False
103 is Happy? True
104 is Happy? False
109 is Happy? True
110 is Happy? False
129 is Happy? True
130 is Happy? True
130 is Happy? True
131 is Happy? False
133 is Happy? True
134 is Happy? False
139 is Happy? True
140 is Happy? False
167 is Happy? True
168 is Happy? False
176 is Happy? True
177 is Happy? False
188 is Happy? True
189 is Happy? False
190 is Happy? True
191 is Happy? False
192 is Happy? True
193 is Happy? True
193 is Happy? True
194 is Happy? False
203 is Happy? True
```

204 is Happy? False
208 is Happy? True
209 is Happy? False
219 is Happy? True
220 is Happy? False
226 is Happy? True
227 is Happy? False
230 is Happy? True
231 is Happy? False
236 is Happy? True
237 is Happy? False
239 is Happy? True
240 is Happy? False
262 is Happy? True
263 is Happy? True
263 is Happy? True
264 is Happy? False
280 is Happy? True
281 is Happy? False
291 is Happy? True
292 is Happy? False
293 is Happy? True
294 is Happy? False
301 is Happy? True
302 is Happy? True
302 is Happy? True
303 is Happy? False
310 is Happy? True
311 is Happy? False
313 is Happy? True
314 is Happy? False
319 is Happy? True
320 is Happy? True
320 is Happy? True
321 is Happy? False
326 is Happy? True
327 is Happy? False
329 is Happy? True
330 is Happy? False

```
331 is Happy? True
332 is Happy? False
338 is Happy? True
339 is Happy? False
356 is Happy? True
357 is Happy? False
362 is Happy? True
363 is Happy? False
365 is Happy? True
366 is Happy? False
367 is Happy? True
368 is Happy? True
368 is Happy? True
369 is Happy? False
376 is Happy? True
377 is Happy? False
379 is Happy? True
380 is Happy? False
383 is Happy? True
384 is Happy? False
386 is Happy? True
387 is Happy? False
391 is Happy? True
392 is Happy? True
392 is Happy? True
393 is Happy? False
397 is Happy? True
398 is Happy? False
404 is Happy? True
405 is Happy? False
409 is Happy? True
410 is Happy? False
440 is Happy? True
441 is Happy? False
446 is Happy? True
447 is Happy? False
464 is Happy? True
465 is Happy? False
469 is Happy? True
```

```
470 is Happy? False
478 is Happy? True
479 is Happy? False
487 is Happy? True
488 is Happy? False
490 is Happy? True
491 is Happy? False
496 is Happy? True
497 is Happy? False
536 is Happy? True
537 is Happy? False
556 is Happy? True
557 is Happy? False
563 is Happy? True
564 is Happy? False
565 is Happy? True
566 is Happy? True
566 is Happy? True
567 is Happy? False
608 is Happy? True
609 is Happy? False
617 is Happy? True
618 is Happy? False
622 is Happy? True
623 is Happy? True
623 is Happy? True
624 is Happy? False
632 is Happy? True
633 is Happy? False
635 is Happy? True
636 is Happy? False
637 is Happy? True
638 is Happy? True
638 is Happy? True
639 is Happy? False
644 is Happy? True
645 is Happy? False
649 is Happy? True
650 is Happy? False
```

```
653 is Happy? True
654 is Happy? False
655 is Happy? True
656 is Happy? True
656 is Happy? True
657 is Happy? False
665 is Happy? True
666 is Happy? False
671 is Happy? True
672 is Happy? False
673 is Happy? True
674 is Happy? False
680 is Happy? True
681 is Happy? False
683 is Happy? True
684 is Happy? False
694 is Happy? True
695 is Happy? False
700 is Happy? True
701 is Happy? False
709 is Happy? True
710 is Happy? False
716 is Happy? True
717 is Happy? False
736 is Happy? True
737 is Happy? False
739 is Happy? True
740 is Happy? False
748 is Happy? True
749 is Happy? False
761 is Happy? True
762 is Happy? False
763 is Happy? True
764 is Happy? False
784 is Happy? True
785 is Happy? False
790 is Happy? True
791 is Happy? False
793 is Happy? True
```

```
794 is Happy? False
802 is Happy? True
803 is Happy? False
806 is Happy? True
807 is Happy? False
818 is Happy? True
819 is Happy? False
820 is Happy? True
821 is Happy? False
833 is Happy? True
834 is Happy? False
836 is Happy? True
837 is Happy? False
847 is Happy? True
848 is Happy? False
860 is Happy? True
861 is Happy? False
863 is Happy? True
864 is Happy? False
874 is Happy? True
875 is Happy? False
881 is Happy? True
882 is Happy? False
888 is Happy? True
889 is Happy? False
899 is Happy? True
900 is Happy? False
901 is Happy? True
902 is Happy? False
904 is Happy? True
905 is Happy? False
907 is Happy? True
908 is Happy? False
910 is Happy? True
911 is Happy? False
912 is Happy? True
913 is Happy? True
913 is Happy? True
914 is Happy? False
```



```
921 is Happy? True
922 is Happy? False
923 is Happy? True
924 is Happy? False
931 is Happy? True
932 is Happy? True
932 is Happy? True
933 is Happy? False
937 is Happy? True
938 is Happy? False
940 is Happy? True
941 is Happy? False
946 is Happy? True
947 is Happy? False
964 is Happy? True
965 is Happy? False
970 is Happy? True
971 is Happy? False
973 is Happy? True
974 is Happy? False
989 is Happy? True
990 is Happy? False
998 is Happy? True
999 is Happy? False
1000 is Happy? True
1001 is Happy? False
```