

1.安装Python编程环境

根据自己的机器配置，选择一个适合的Python版本的基础软件进行安装。可以不用安装比较大的集成开发环境GUI。

```
In [1]: !python --version
```

Python 3.13.1

2.判断水仙花数

水仙花数（Narcissistic number）也被称为超完全数字不变数（pluperfect digital invariant, PPDl）、自恋数、自幂数、阿姆斯壮数或阿姆斯特朗数（Armstrong number）。水仙花数是指一种特殊的数字序列，是指一个位数(),其每个数位上的数字的次幂之和等该数本身，即:

$$\overline{a_1a_2\cdots a_n} = \sum_{i=1}^n (a_i)^n \quad n \geq 3$$

```
In [2]: def judge(a:int) -> bool:
        b=0
        c=a
        n = len(str(a))
        while a:
            b+=(a%10)**n
            a//=10
        return b==c
```

```
In [3]: inputs_1 = [100, 123, 153, 154, 370, 371, 372, 407, 408, 1000, 1234]
        expected_1 = [False, False, True, False, True, True, False, True,
        for i in range(len(inputs_1)):
            print(f"Input: {inputs_1[i]}")
            print(f"Expected: {expected_1[i]}")
            print(f"Actual: {judge(inputs_1[i])}")
            print("")
```

Input: 100
Expected: False
Actual: False

Input: 123
Expected: False
Actual: False

Input: 153
Expected: True
Actual: True

Input: 154
Expected: False
Actual: False

Input: 370
Expected: True
Actual: True

Input: 371
Expected: True
Actual: True

Input: 372
Expected: False
Actual: False

Input: 407
Expected: True
Actual: True

Input: 408
Expected: False
Actual: False

Input: 1000
Expected: False
Actual: False

Input: 1234
Expected: False
Actual: False

Input: 1634
Expected: True
Actual: True

Input: 1635
Expected: False
Actual: False

Input: 8208
Expected: True
Actual: True

Input: 8209
Expected: False
Actual: False

Input: 9474
Expected: True
Actual: True

Input: 9475
Expected: False
Actual: False

Input: 10000
Expected: False
Actual: False

Input: 12345
Expected: False
Actual: False

Input: 54748
Expected: True
Actual: True

Input: 54749
Expected: False
Actual: False

Input: 92727
Expected: True
Actual: True

Input: 92728
Expected: False
Actual: False

Input: 93084
Expected: True
Actual: True

Input: 93085
Expected: False
Actual: False

Input: 100000
Expected: False
Actual: False

Input: 123456
Expected: False
Actual: False

Input: 548834
Expected: True
Actual: True

Input: 548835
Expected: False
Actual: False

经过样例测试程序运行时没有问题，无异常出现。这个“程序运行时的分析”我真的不知道怎么写。代码一遍过的，也没用什么高级的算法，就只有模拟过程。

3.假设有一张无限大并且厚度为0.104毫米的纸，可以任意地折叠，那么要折叠多少次可以超过珠穆朗玛峰的高度？如果能折叠100次，那么将会有多厚？能否冲出银河系？

```
In [4]: import numpy as np
#为什么题目不给珠穆朗玛峰的高度与银河系直径
LIGHT_YEAR = 9.4607304725808e15
milky_way_diameter = (87400+3600) * LIGHT_YEAR #银河直径为87400±3600光年
Qomolangma_length = 8848.86
paper_thickness = 0.104e-3
```

定义了一些常量并导入numpy用于log2()函数与ceil()函数

```
In [5]: n_qomolangma = int(np.ceil(np.log2(Qomolangma_length / paper_thickness_100)))
thickness_100 = paper_thickness * (2 ** 100)
escape_galaxy = thickness_100 > milky_way_diameter
print(f"折叠 {n_qomolangma} 次可超过珠穆朗玛峰 ({Qomolangma_length} 米)")
print(f"折叠 100 次后厚度为: {thickness_100:.3e} 米")
print(f"银河系直径约为: {milky_way_diameter:.3e} 米")
print(f"能否冲出银河系? {'能' if escape_galaxy else '不能'})")
```

折叠 27 次可超过珠穆朗玛峰 (8848.86 米)

折叠 100 次后厚度为: 1.318e+26 米

银河系直径约为: 8.609e+20 米

能否冲出银河系? 能

程序运行时没有问题

回文数判断

回文数是指如下形式的数: 121、2552、12321、889988等的数。编写程序, 从键盘输入一个整数, 判断是否是回文数。

```
In [6]: def is_palindrome(n:str)->bool:
        if not n.isdigit(): return False
        if len(n) > 1 and n[0] == '0': return False
        return n == n[::-1]
```

```
In [7]: inputs_2 = ["121", "123", "0", "7", "-121", "1221", "12321", "10", "123210"]
expected_2 = [True, False, True, True, False, True, True, False, False]

for i in range(len(inputs_2)):
    print(f"Input: {inputs_2[i]}")
    print(f"Expected: {expected_2[i]}")
    print(f"Actual: {is_palindrome(inputs_2[i])}")
    print("")
```

Input: 121

Expected: True

Actual: True

Input: 123

Expected: False

Actual: False

Input: 0

Expected: True

Actual: True

Input: 7
Expected: True
Actual: True

Input: -121
Expected: False
Actual: False

Input: 1221
Expected: True
Actual: True

Input: 12321
Expected: True
Actual: True

Input: 10
Expected: False
Actual: False

Input: 010
Expected: False
Actual: False

Input: 123454321
Expected: True
Actual: True

Input: abc
Expected: False
Actual: False

Input: 11
Expected: True
Actual: True

Input: 12
Expected: False
Actual: False

Input: 98789
Expected: True
Actual: True

Input: 1001
Expected: True
Actual: True

Input: 100
Expected: False
Actual: False

Input: a
Expected: False

Actual: False

Input: aba
Expected: False
Actual: False

Input: 12.21
Expected: False
Actual: False

Input: 123321
Expected: True
Actual: True

经测试，代码没有问题，因而给出

```
In [8]: print(is_palindrome(input()))
```

True