AI 程序设计@NJU

实验 3 Python 控制结构和函数参考答案

1．寻找特殊数对

```
def fac(n):
    s = 0
    for i in range(1, n):
        if n%i == 0:
            s += i
    return s

n = int(input())
for i in range(1, n+1):
    m = fac(i)
    k = fac(m)
    if i == k and i < m:
        print("{}-{}".format(i, m))
```

2．输出九九乘法口诀表

```
for i in range(1, 10):
    for j in range(1, 10):
        print("{}*{}={}".format(i,j,i*j), end = ' ')
    print('')
```

3. 找完数

```
from math import sqrt

def get_child(num):
    temp = num
    lst = [1]
    for i in range(2, temp):
        if temp % i == 0:
            lst.append(i)
    return lst

for num in range(2, int(input())):
    if sum(get_child(num)) == num:
        print(num)
```

4. 统计字符个数

```
str1 = input()

str1 = str1.lower()
lst = []
# 借助 ASCII 码值
for i in range(97, 123):
    lst.append(str1.count(chr(i)))
print(lst)
```

5. 求矩阵对角线元素和

```
lst = []
n = int(input())
for i in range(n):
    temp = []
    for j in input().split():
        temp.append(int(j))
    lst.append(temp)

# 注意不要用 sum 作为变量名
s = 0
for i in range(n):
    for j in range(n):
        if i == j or i+j == n-1:
            s += lst[i][j]
print(s)
```

6.角谷猜想

```
n = int(input())
while n != 1:
    if n%2 == 0:
        n = n/2
        print("%d/2=%d"%(n*2, n))
    else:
        print("%d*3+1=%d"%(n, n*3+1))
        n = n*3+1
```

7.统计单词词频

```
s = input()

# 用列表记录标点的方式方便处理非单个字符的标点符号例如...
for i in [',','.','!','?','...']:
    s = s.replace(i, ' ')
s = s.lower()
```

```
words = s.split()
d = {}
for word in words:
    d[word] = d.get(word, 0) + 1
# wordset = set(words)
# d = {}.fromkeys((wordset),0)
# for item in words:
#     d[item] += 1
# 需要排序，不能直接遍历 d.items()，因为字典是无序的，即不能保证一定排序
result = sorted(d.items(), key = lambda d:(d[1], d[0]))
for item in result:
    print(item[0], item[1])
```

8. 数数字

```
n = int(input())

# 用空串连接各数字，这种方式方便记录超过 1 位长度的数字，后续算法简单
s = ''
for i in range(1, n+1):
    s += str(i)

for num in range(10):
    print(s.count(str(num)), end = ' ')
```

9. 寻找前 n 个默尼森数

```
import math

def isprime(x):
    if x == 1:
        return False
    k = int(math.sqrt(x))
    for j in range(2, k+1):
       if x % j == 0:
           return False
    return True

count = 1
p = 1
while count <= 5:
    p += 1
    if isprime(p):
        if isprime(2**p - 1):
            print(p, 2**p - 1)
            count += 1
```

10. 循环移动字符串

```
def move_substr(s, flag, n):
    if n > len(s):
        warning = "the n is too large"
        return warning
    else:
        if flag == 1:
            newstr = s[n:] + s[:n]
        if flag == 2:
            newstr = s[-n:] + s[:-n]
        return newstr

if __name__ == '__main__':
    args = input().split(',')
    s = args[0]
    flag = int(args[1])
    n = int(args[2])
    print(move_substr(s, flag, n))
```