

Assignment #2: 编程练习

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2024 spring, Compiled by 赵策 数学科学学院

编程环境

操作系统: Windows 11

Python编程环境: Visual Studio Code 1.86.2

1. 题目

27653: Fraction类

http://cs101.openjudge.cn/2024sp_routine/27653/

思路:

代码

```
#
def gcd(m,n):
    while m%n != 0:
        oldm = m
        oldn = n
        m = oldn
        n = oldm%oldn
    return n
class Fraction:
    def __init__(self,top,bottom):
        self.num=top
        self.den=bottom
    def __str__(self):
        return str(self.num) + "/" + str(self.den)
    def __add__(self, otherfraction):
        newnum = self.num * otherfraction.den + self.den * otherfraction.num
        newden = self.den * otherfraction.den
        common = gcd(newnum, newden)
        return Fraction(newnum//common, newden//common)
a,b,c,d=map(int,input().split())
print(Fraction(a,b)+Fraction(c,d))
```

代码运行截图 (至少包含有"Accepted")

状态: Accepted

源代码

```
def gcd(m,n):
    while m%n != 0:
        oldm = m
        oldn = n
        m = oldn
        n = oldm%oldn
    return n
class Fraction:
    def __init__(self,top,bottom):
        self.num=top
        self.den=bottom
    def __str__(self):
        return str(self.num) + "/" + str(self.den)
    def __add__(self, otherfraction):
        newnum = self.num * otherfraction.den + self.den * otherfraction.num
        newden = self.den * otherfraction.den
        common = gcd(newnum, newden)
        return Fraction(newnum//common, newden//common)
a,b,c,d=map(int,input().split())
print(Fraction(a,b)+Fraction(c,d))
```

04110: 圣诞老人的礼物-Santa Clau's Gifts

greedy/dp, <http://cs101.openjudge.cn/practice/04110>

思路:

代码

```
#
n,w=map(int,input().split())
val=[]
for _ in range(n):
    v,wi=map(int,input().split())
    val_per=v/wi
    for _ in range(wi):
        val.append(val_per)
val.sort(reverse=True)
val_sum=sum(val[:w])
print('{:.1f}'.format(val_sum))
```

代码运行截图 (至少包含有"Accepted")

状态: Accepted

原代码

```
n,w=map(int,input().split())
val=[]
for _ in range(n):
    v,wi=map(int,input().split())
    val_per=v/wi
    for _ in range(wi):
        val.append(val_per)
val.sort(reverse=True)
val_sum=sum(val[:w])
print('{:.1f}'.format(val_sum))
```

18182: 打怪兽

implementation/sortings/data structures, <http://cs101.openjudge.cn/practice/18182/>

思路:

代码

```
#
from collections import defaultdict
res=[]
for _ in range(int(input())):
    a=defaultdict(list)
    n,m,b=map(int,input().split())
    for _ in range(n):
        t,x=map(int,input().split())
        a[t].append(x)
    for t in sorted(a):
        b-=sum(sorted(a[t],reverse=True)[:m])
        if b<=0:
            res.append(t)
            break
    else:
        res.append('alive')
for _ in res:
    print(_)
```

代码运行截图 (AC代码截图, 至少包含有"Accepted")

状态: Accepted

源代码

```
from collections import defaultdict
res=[]
for _ in range(int(input())):
    a=defaultdict(list)
    n,m,b=map(int,input().split())
    for _ in range(n):
        t,x=map(int,input().split())
        a[t].append(x)
    for t in sorted(a):
        b-=sum(sorted(a[t],reverse=True)[:m])
        if b<=0:
            res.append(t)
            break
    else:
        res.append('alive')
for _ in res:
    print(_)
```

230B. T-primes

binary search/implementation/math/number theory, 1300, <http://codeforces.com/problemset/problem/230/B>

思路:

代码

```
#
from math import sqrt
N=10**6
s=[True]*(N+2)
p=2
s[1]=False
```

```

while p<N:
    if s[p]:
        for i in range(2*p,N+1,p):
            s[i]=False
        p+=1

n=int(input())
nums=list(map(int,input().split()))
for i in range(n):
    a=nums[i]
    b=int(sqrt(a))
    if b**2==a and s[b]:
        print('YES')
    else:
        print('NO')

```

代码运行截图 (AC代码截图, 至少包含有"Accepted")

230B - T-primes	Python 3	Accepted
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1364A. XXXXX

brute force/data structures/number theory/two pointers, 1200, <https://codeforces.com/problemset/problem/1364/A>

思路:

代码

```

#
for _ in range(int(input())):
    a,b=map(int,input().split())
    s=-1
    A=list(map(lambda x:int(x)%b,input().split()))
    if sum(A)%b!=0:
        print(a)
        continue
    for i in range(a//2+1):
        if A[i] or A[a-i-1]:
            s=a-i-1
            break
    print(s)

```

代码运行截图 (AC代码截图, 至少包含有"Accepted")

1364A - XXXXX	Python 3	Accepted
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18176: 2050年成绩计算

<http://cs101.openjudge.cn/practice/18176/>

思路：

代码

```
#
from math import sqrt
N = 10005
s=[True]*N
p=2
while p*p<=N:
    if s[p]:
        for i in range(p*2,N,p):
            s[i]=False
        p+=1

m,n=map(int,input().split())
for _ in range(m):
    s0=[int(i) for i in input().split()]
    l=len(s0)
    sum=0
    for a in s0:
        b=int(sqrt(a))
        if b**2==a and s[b]:
            sum+=a
    sum/=l
    if sum==0:
        print(0)
    else:
        print('%.2f'%sum)
```

代码运行截图 (AC代码截图, 至少包含有"Accepted")

状态: Accepted

源代码

```
from math import sqrt
N = 10005
s=[True]*N
p=2
while p*p<=N:
    if s[p]:
        for i in range(p*2,N,p):
            s[i]=False
        p+=1

m,n=map(int,input().split())
for _ in range(m):
    s0=[int(i) for i in input().split()]
    l=len(s0)
    sum=0
    for a in s0:
        b=int(sqrt(a))
        if b**2==a and s[b]:
            sum+=a
    sum/=l
    if sum==0:
        print(0)
    else:
        print('%.2f'%sum)
```

2. 学习总结和收获

如果作业题目简单，有否额外练习题目，比如：OJ“2024spring每日选做”、CF、LeetCode、洛谷等网站题目。

本次作业相比第一次提高了一些难度，需要考虑算法时间复杂度，记录常用算法

(如欧拉筛：

```
from math import sqrt
N=10*6
s=[True]*(N+2)
p=2
s[1]=False
while p<N:
    if s[p]:
        for i in range(2*p,N+1,p):
            s[i]=False
        p+=1
)
```

需要巩固基础并加强练习