Assignment #2: 编程练习

Updated 0953 GMT+8 Feb 24, 2024

2024 spring, Complied by ==同学的姓名、院系==

说明：

1）The complete process to learn DSA from scratch can be broken into 4 parts:

- Learn about Time and Space complexities
- Learn the basics of individual Data Structures
- Learn the basics of Algorithms
- Practice Problems on DSA

2）请把每个题目解题思路（可选），源码Python, 或者C++（已经在Codeforces/Openjudge上AC），截图（包含Accepted），填写到下面作业模版中（推荐使用 typora https://typoraio.cn ，或者用word）。AC 或者没有AC，都请标上每个题目大致花费时间。

3）课程网站是Canvas平台, https://pku.instructure.com, 学校通知3月1日导入选课名单后启用。**作业写好后，保留在自己手中，待3月1日提交。**

提交时候先提交pdf文件，再把md或者doc文件上传到右侧“作业评论”。Canvas需要有同学清晰头像、提交文件有pdf、"作业评论"区有上传的md或者doc附件。

4）如果不能在截止前提交作业，请写明原因。

编程环境

==（请改为同学的操作系统、编程环境等）==

操作系统：macOS Ventura 13.4.1 (c)

Python编程环境：Spyder IDE 5.2.2, PyCharm 2023.1.4 (Professional Edition)

C/C++编程环境：Mac terminal vi (version 9.0.1424), g++/gcc (Apple clang version 14.0.3, clang-1403.0.22.14.1)

1. 题目

27653: Fraction类

http://cs101.openjudge.cn/practice/27653/

思路：

代码

```
#
a,b,c,d=[int(i) for i in input().split()]
x=2
y=1
p=b
q=d
while x<=p and x<=q:
    if(p%x==0 and q%x==0):
        y=y*x
        p=p/x
        q=q/x
    else:
        x+=1
mom=b*d/y
son=a*d/y+c*b/y
x=2
while x<=son and x<=mom:
    if(mom%x==0 and son%x==0):
        mom=mom/x
        son=son/x
    else:
        x+=1
mom=int(mom)
son=int(son)
print(f"{son}/{mom}")
```

代码运行截图 ==（至少包含有"Accepted"）==

状态: Accepted

源代码

```
a,b,c,d=[int(i) for i in input().split()]
x=2
y=1
p=b
q=d
while x<=p and x<=q:
    if(p%x==0 and q%x==0):
        y=y*x
        p=p/x
        q=q/x
    else:
        x+=1
mom=b*d/y
son=a*d/y+c*b/y
x=2
while x<=son and x<=mom:
    if(mom%x==0 and son%x==0):
        mom=mom/x
        son=son/x
    else:
        x+=1
mom=int(mom)
son=int(son)
print(f"{son}/{mom}")
```

04110: 圣诞老人的礼物-Santa Clau’s Gifts

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

思路:

代码

```
#
a=[]
n,m=[int(i) for i in input().split()]
for i in range(n):
    a.append([int(j) for j in input().split()])
    a[i].append(a[i][0]/a[i][1])
for i in range(1,n):
    for j in range(0,n-i):
        if(a[j][2]<a[j+1][2]):
            a[j],a[j+1]=a[j+1],a[j]
val=0
car=m
for i in range(n):
```

```
    if(car-a[i][1]>=0):
        car-=a[i][1]
        val+=a[i][0]
    else:
        val+=a[i][0]*car/a[i][1]
        break
val=float(val)
print(round(val,1))
```

代码运行截图 ==（至少包含有"Accepted"）==

#41900557提交状态

状态: Accepted

源代码

```
a=[]
n,m=[int(i) for i in input().split()]
for i in range(n):
    a.append([int(j) for j in input().split()])
    a[i].append(a[i][0]/a[i][1])
for i in range(1,n):
    for j in range(0,n-i):
        if(a[j][2]<a[j+1][2]):
            a[j],a[j+1]=a[j+1],a[j]
val=0
car=m
for i in range(n):
    if(car-a[i][1]>=0):
        car-=a[i][1]
        val+=a[i][0]
    else:
        val+=a[i][0]*car/a[i][1]
        break
val=float(val)
print(round(val,1))
```

18182: 打怪兽

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

思路:

代码

```
#
def quicks(lst):
    if(len(lst)<=1):
        return lst
    left=[]
    right=[]
    for i in range(1,len(lst)):
        if(lst[i][0]<lst[0][0]):
            left.append(lst[i])
        elif(lst[i][0]==lst[0][0] and lst[i][1]>lst[0][1]):
            left.append(lst[i])
        else:
            right.append(lst[i])
    return quicks(left)+[lst[0]]+quicks(right)
l=int(input())
for i in range(l):
    n,m,b=[int(i) for i in input().split()]
    a=n*[0]
    for j in range(n):
        a[j]=[int(i) for i in input().split()]
    a=quicks(a)
    flag=0
    he=0
    ha=0
    summ=0
    for j in range(n):
        if(flag<m and a[j][0]==he):
            flag+=1
            summ+=a[j][1]
        elif(a[j][0]!=he):
            he=a[j][0]
            flag=1
            summ+=a[j][1]
        if(summ>=b):
            print(he)
            ha=1
            break
    if(ha==0):
        print('alive')
```

代码运行截图 ==（AC代码截图，至少包含有"Accepted"）==

#4227234提交状态

状态：Accepted

源代码

```
def quicks(lst):
    if(len(lst)<=1):
        return lst
    left=[]
    right=[]
    for i in range(1,len(lst)):
        if(lst[i][0]<lst[0][0]):
            left.append(lst[i])
        elif(lst[i][0]==lst[0][0] and lst[i][1]>lst[0][1]):
            left.append(lst[i])
        else:
            right.append(lst[i])
    return quicks(left)+[lst[0]]+quicks(right)
l=int(input())
for i in range(l):
    n,m,b=[int(i) for i in input().split()]
    a=n*[0]
    for j in range(n):
        a[j]=[int(i) for i in input().split()]
    a=quicks(a)
    flag=0
    he=0
    ha=0
    summ=0
    for j in range(n):
        if(flag<m and a[j][0]==he):
            flag+=1
            summ+=a[j][1]
        elif(a[j][0]!=he):
            he=a[j][0]
            flag=1
            summ+=a[j][1]
        if(summ>=b):
            print(he)
            ha=1
            break
    if(ha==0):
        print('alive')
```


230B. T-primes

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

思路：

代码

```
#
def is_prime(num):
    if num == 2:
        return True
```

```
    elif num % 2 == 0:
        return False
    for i in range(3, int(num**0.5)+1, 2):
        if num%i ==0:
            return False

    return True

n=int(input())
s=[int(i) for i in input().split()]
for i in range(0,n):
    if(s[i]==1):
        print("NO")
        continue
    num=s[i]**0.5
    if(num==int(num)):
        num=int(num)
        if(is_prime(num)):
            print("YES")
        else:
            print("NO")
    else:
        print("NO")
```

代码运行截图 ==（AC代码截图，至少包含有"Accepted"）==

PROBLEMS SUBMIT CODE MY SUBMISSIONS STATUS HACKS ROOM STANDINGS CUSTOM INVOCATION

General

#	Author	Problem	Lang	Verdict	Time	Memory	Sent	Judged		
228363101	Practice: Lysinex	230B - 28	PyPy 3-64	Accepted	1310 ms	13276 KB	2023-10-16 06:12:35	2023-10-16 06:12:35	☆	Com

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```
# -*- coding: utf-8 -*-
"""
Created on Sun Oct 15 23:48:21 2023

@author: 雷雨松
"""
def is_prime(num):
    if num == 2:
        return True
    elif num % 2 == 0:
        return False
    for i in range(3, int(num**0.5)+1, 2):
        if num%i ==0:
            return False

    return True

n=int(input())
s=[int(i) for i in input().split()]
for i in range(0,n):
    if(s[i]==1):
        print("NO")
        continue
    num=s[i]**0.5
    if(num==int(num)):
        num=int(num)
        if(is_prime(num)):
            print("YES")
        else:
            print("NO")
    else:
        print("NO")
```

1364A. XXXXX

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

思路:

代码

```
def dp(x,y):
    global d
    if(y-x)<d:
        return -1
    if(sum(a[x:y])%q!=0):
        if(y-x>d):
            d=y-x
        return y-x
    if(x>=y-1):
        return -1
    return max(dp(x+1,y),dp(x,y-1))
n=int(input())
```

```
for i in range(n):
    p,q=map(int,input().split())
    d=0
    a=list(map(int,input().split()))
    print(dp(0,p)
```

代码运行截图 ==（AC代码截图，至少包含有"Accepted"）==

General

#	Author	Problem	Lang	Verdict	Time	Memory	Sent	Judged		
250289356	Practice: Lysinex	1364A - 15	PyPy 3-64	Runtime error on test 3	296 ms	11572 KB	2024-03-09 06:50:52	2024-03-09 06:50:52		Compare

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```
def dp(x,y):
    global d
    if(y-x)<d:
        return -1
    if(sum(a[x:y])%q!=0):
        if(y-x>d):
            d=y-x
        return y-x
    if(x>=y-1):
        return -1
    return max(dp(x+1,y),dp(x,y-1))
n=int(input())
for i in range(n):
    p,q=map(int,input().split())
    d=0
    a=list(map(int,input().split()))
    print(dp(0,p))
```

18176: 2050年成绩计算

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

思路：

代码

```
s=10001*[1]
s[1]=0
for i in range(2,101):
    for j in range(2*i,10001,i):
        s[j]=0
n,m=map(int,input().split())
for i in range(n):
    sum=0
    a=[int(i)**0.5 for i in input().split()]
    k=len(a)
    for i in range(k):
        if(a[i]==int(a[i]) and s[int(a[i])]==1):
            sum+=a[i]**2
    if(sum==0):
```

```
        print(0)
    else:
        print(format(sum/k,'.2f'))#
```

代码运行截图 ==（AC代码截图，至少包含有"Accepted"）==

状态：Accepted

源代码

```
s=10001*[1]
s[1]=0
for i in range(2,101):
    for j in range(2*i,10001,i):
        s[j]=0
n,m=map(int,input().split())
for i in range(n):
    sum=0
    a=[int(i)**0.5 for i in input().split()]
    k=len(a)
    for i in range(k):
        if(a[i]==int(a[i]) and s[int(a[i])]==1):
            sum+=a[i]**2
    if(sum==0):
        print(0)
    else:
        print(format(sum/k,'.2f'))
```

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。==

这次的题目都很简单...除了一道题，xxxxx

xxxxx，感觉思路也挺简单的。我用递归一下就写完了，但一直报错re，exit code=1。我有点蒙，一开始以为是递归深度的问题，尝试剪枝，但还是re。看题解吧，胡同学的代码又太过精深，真的看不懂...网上的题解也都是c或者c++，也看不懂...于是就放弃了，不太晓得问题是什么