

Assignment #2: 编程练习

Updated 0953 GMT+8 Feb 24, 2024

2024 spring, Compiled by ==同学的姓名、院系==

赵云天 生命科学学院

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: win 10

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/2024sp_routine/27653/

思路: 先计算出形式, 然后对分数化简

代码

```
import math
a,b,c,d = map(int,input().split())
e = a*d + b*c
f = b*d
i = 2
while i < a*d + b*c:
    if math.ceil(e/i) == e//i and math.ceil(f/i) == f//i:
        e = e//i
        f = f//i
    else:
        i+=1
print(str(e)+'/'+str(f))
```

代码运行截图 == (至少包含有"Accepted") ==

#43963966提交状态

[查看](#) [提交](#) [统计](#) [提问](#)

状态: Accepted

源代码

```
import math
a,b,c,d = map(int,input().split())
e = a*d + b*c
f = b*d
i = 2
while i < a*d + b*c:
    if math.ceil(e/i) == e//i and math.ceil(f/i) == f//i:
        e = e//i
        f = f//i
    else:
        i+=1
print(str(e)+'/'+str(f))
```

基本信息

#: 43963966

题目: 27653

提交人: 23n2300012140(zyt)

内存: 3736kB

时间: 21ms

语言: Python3

提交时间: 2024-02-22 22:30:57

©2002-2022 POJ 京ICP备20010980号-1

[English](#) [帮助](#) [关于](#)

04110: 圣诞老人的礼物-Santa Clau's Gifts

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

思路: 按照单位重量价值排序来放置, 重量超过的部分分开放置

代码

```
n,w = map(int,input().split())
a = []
for _ in range(n):
    a.append(list(map(int,input().split())))
for i in range(n):
    a[i].append(a[i][0]/a[i][1])
a.sort(key=lambda x:x[2])
b = 0
v = 0
```

```

while b+a[-1][1]<= w:
    v += a[-1][0]
    b += a[-1][1]
    a.pop()
    if a == []:
        break
if a != []:
    v += (w-b)*a[-1][2]
print("{:.1f}".format(v))

```

代码运行截图 == (至少包含有"Accepted") ==

#43990553提交状态

[查看](#) [提交](#) [统计](#) [提问](#)

状态: Accepted

源代码

```

n,w = map(int,input().split())
a = []
for _ in range(n):
    a.append(list(map(int,input().split())))
for i in range(n):
    a[i].append(a[i][0]/a[i][1])
a.sort(key=lambda x:x[2])
b = 0
v = 0
while b+a[-1][1]<= w:
    v += a[-1][0]
    b += a[-1][1]
    a.pop()
    if a == []:
        break
if a != []:
    v += (w-b)*a[-1][2]
print("{:.1f}".format(v))

```

基本信息

#: 43990553
 题目: 04110
 提交人: 23n2300012140(zyt)
 内存: 3968kB
 时间: 21ms
 语言: Python3
 提交时间: 2024-02-26 15:53:15

18182: 打怪兽

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

思路: 按照时间顺序扣血, 相同时间时由高往低扣血

代码

```

ncases = int(input())
for _ in range(ncases):
    n,m,b = map(int,input().split())
    a = []
    for _ in range(n):
        a.append(list(map(int,input().split())))
    a.sort(key=lambda x: x[0])
    i= 0
    while i < n:
        num = 0
        cost = 0
        bb = []

```

```

        for j in range(n):
            if a[j][0] == a[i][0]:
                num += 1
                bb.append(a[j])
                cost += a[j][1]
        bb.sort(key = lambda x: (-x[1]))
        for k in range(min(m, len(bb))):
            b -= bb[k][1]
        if b <= 0:
            print(a[i][0])
            break
        else:
            i += num
    if b > 0:
        print('alive')

```

代码运行截图 == (AC代码截图, 至少包含有"Accepted") ==

#43998452提交状态

[查看](#) [提交](#) [统计](#) [提问](#)

状态: Accepted

源代码

```

ncases = int(input())
for _ in range(ncases):
    n,m,b = map(int,input().split())
    a = []
    for _ in range(n):
        a.append(list(map(int,input().split())))
    a.sort(key=lambda x: x[0])
    i = 0
    while i < n:
        num = 0
        cost = 0
        bb = []
        for j in range(n):
            if a[j][0] == a[i][0]:
                num += 1
                bb.append(a[j])
                cost += a[j][1]
        bb.sort(key = lambda x: (-x[1]))
        if num <= m:
            b -= cost
        else:

```

基本信息

#: 43998452
 题目: 18182
 提交人: 23n2300012140(zyt)
 内存: 3772kB
 时间: 89ms
 语言: Python3
 提交时间: 2024-02-27 19:13:32

230B. T-primes

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

思路: 直接对反映质数的列表做处理, 再转换为所需数字时会超时。

代码

```
n = int(input())
c = [int(x) for x in input().split()]
primes = [True] * (10**6+1)
primes[0], primes[1] = False, False
for p in range(2, int(10**3) + 1):
    if primes[p]:
        for i in range(p*p, 10**6+1, p):
            primes[i] = False
for k in range(n):
    if (c[k]**0.5).is_integer():
        if primes[int(c[k]**0.5)]:
            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") ==

By zyt_201, contest: Codeforces Round 142 (Div. 2), problem: (B) T-primes, **Accepted**, #, [Copy](#)

```
n = int(input())
c = [int(x) for x in input().split()]
primes = [True] * (10**6+1)
primes[0], primes[1] = False, False
for p in range(2, int(10**3) + 1):
    if primes[p]:
        for i in range(p*p, 10**6+1, p):
            primes[i] = False
for k in range(n):
    if (c[k]**0.5).is_integer():
        if primes[int(c[k]**0.5)]:
            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：倒向寻找不能被整除的数

代码

```
n = int(input())
for _ in range(n):
    a,b = map(int,input().split())
    c = list(map(lambda x:int(x) % b ,input().split()))
    sumc = sum(c)
    numc = len(c)
    if sumc % b != 0:
```

```

        print(numc)
    else:
        i = 0
        while i <= a//2-1 or i == 0:
            if c[i] != 0 or c[-i-1] != 0:
                print(numc-1)
                break
            else:
                numc -= 1
                i += 1
        if i > a//2 - 1:
            print(-1)

```

代码运行截图 == (AC代码截图, 至少包含有"Accepted") ==

By zyt_201, contest: Codeforces Round 649 (Div. 2), problem: (A) XXXXX, **Accepted**, #, [Copy](#)

```

n = int(input())
for _ in range(n):
    a, b = map(int, input().split())
    c = list(map(lambda x: int(x) % b, input().split()))
    sumc = sum(c)
    numc = len(c)
    if sumc % b != 0:
        print(numc)
    else:
        i = 0
        while i <= a//2-1 or i == 0:
            if c[i] != 0 or c[-i-1] != 0:
                print(numc-1)
                break
            else:
                numc -= 1
                i += 1
        if i > a//2 - 1:
            print(-1)

```

18176: 2050年成绩计算

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

思路: 是t-prime的一个变形题目

代码

```

m, n = map(int, input().split())
primes = [True] * (10**4+1)
primes[0], primes[1] = False, False
for p in range(2, int(10**2) + 1):
    if primes[p]:
        for i in range(p*p, 10**4+1, p):
            primes[i] = False
for _ in range(m):
    lis = list(map(int, input().split()))
    a = []
    for j in range(len(lis)):
        if (lis[j]**0.5).is_integer():
            if primes[int(lis[j]**0.5)]:

```

```
        a.append(lis[j])

    if a == []:
        print(0)
    else:
        f = sum(a)/len(lis)
        print("{:.2f}".format(f))
```

代码运行截图 == (AC代码截图，至少包含有"Accepted") ==

#43997630提交状态

[查看](#) [提交](#) [统计](#) [提问](#)

状态: Accepted

源代码

```
m,n = map(int,input().split())
primes = [True] * (10**4+1)
primes[0], primes[1] = False, False
for p in range(2, int(10**2) + 1):
    if primes[p]:
        for i in range(p*p, 10**4+1, p):
            primes[i] = False
for _ in range(m):
    lis = list(map(int,input().split()))
    a = []
    for j in range(len(lis)):
        if (lis[j]**0.5).is_integer():
            if primes[int(lis[j]**0.5)]:
                a.append(lis[j])

    if a == []:
        print(0)
    else:
        f = sum(a)/len(lis)
        print("{:.2f}".format(f))
```

基本信息

#: 43997630
题目: 18176
提交人: 23n2300012140(zyt)
内存: 4092kB
时间: 62ms
语言: Python3
提交时间: 2024-02-27 17:30:38

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。==

作业完成质量远高于上学期；

每天都在写选做