

# Assignment #7: 贪心和DP

---

Updated 0919 GMT+8 Oct 24, 2023

2023 fall, Compiled by ==同学的姓名、院系==雷雨松 生命科学学院

## 说明:

1) 请把每个题目解题思路 (可选), 源码Python, 或者C++/C (已经在Codeforces/Openjudge上AC), 截图 (包含Accepted, 学号), 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) 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、作业评论有md或者doc。

4) 如果不能在截止前提交作业, 请写明原因。

另外, CF的题目, 在洛谷有中文翻译, 例如 <https://www.luogu.com.cn/problem/CF1764C>

## 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. 必做题目

---

### 158B. Taxi

\*special problem, greedy, implementation, 1100

<https://codeforces.com/problemset/problem/158/B>

思路:

代码

```
#
import math
n=int(input())
s=[int(i) for i in input().split()]
s1=0
s2=0
s3=0
s4=0
```

```

for i in range(n):
    if(s[i]==1):
        s1+=1
    if(s[i]==2):
        s2+=1
    if(s[i]==3):
        s3+=1
    if(s[i]==4):
        s4+=1
flag=0
flag+=(s4+s3+s2//2)
s1=max(0,s1-s3)
s2-=(s2//2)*2
if(s2==0 and s1!=0):
    flag+=math.ceil(s1/4)
elif(s2==1):
    if(s1<=2):
        flag+=1
    else:
        flag+=(1+math.ceil((s1-2)/4))
print(flag)

```

代码运行截图 == (至少包含有"Accepted") ==

[MAIN](#)
[ALMSGURU](#)
[PROBLEMS](#)
[SUBMIT](#)
[STATUS](#)
[STANDINGS](#)
[CUSTOM TEST](#)

General

#	Author	Problem	Lang	Verdict	Time	Memory	Sent	Judged		
230339331	Practice: Lysinex	<a href="#">158B</a> - 10	PyPy 3-64	Accepted	186 ms	7972 KB	2023-10-29 11:55:48	2023-10-29 11:55:48		Compare

→ Source

Copy

```

import math
n=int(input())
s=[int(i) for i in input().split()]
s1=0
s2=0
s3=0
s4=0
for i in range(n):
    if(s[i]==1):
        s1+=1
    if(s[i]==2):
        s2+=1
    if(s[i]==3):
        s3+=1
    if(s[i]==4):
        s4+=1
flag=0
flag+=(s4+s3+s2//2)
s1=max(0,s1-s3)
s2-=(s2//2)*2
if(s2==0 and s1!=0):
    flag+=math.ceil(s1/4)
elif(s2==1):
    if(s1<=2):
        flag+=1
    else:
        flag+=(1+math.ceil((s1-2)/4))
print(flag)

```

## 545D. Queue

greedy, implementation, sortings, 1300

<https://codeforces.com/problemset/problem/545/D>

思路：

代码

```
#
n=int(input())
s=[int(i) for i in input().split()]
s.sort()
all_=0
flag=n
for i in range(n):
    if(all_>s[i]):
        flag-=1
    else:
        all_+=s[i]
print(flag)
```

代码运行截图 == (至少包含有"Accepted") ==

[MAIN](#) [ACMSGURU](#) | [PROBLEMS](#) [SUBMIT](#) [STATUS](#) [STANDINGS](#) [CUSTOM TEST](#)

General

#	Author	Problem	Lang	Verdict	Time	Memory	Sent	Judged		
230334150	Practice: Lysinex	<a href="#">545D</a> - 9	PyPy 3-64	Accepted	109 ms	12040 KB	2023-10- 29 11:19:05	2023-10- 29 11:19:05	★	<a href="#">Compare</a>

→ Source

Copy

```
n=int(input())
s=[int(i) for i in input().split()]
s.sort()
all_=0
flag=n
for i in range(n):
    if(all_>s[i]):
        flag-=1
    else:
        all_+=s[i]
print(flag)
```

## 803A. Maximal Binary Matrixcon

constructive algorithms, 1400

<https://codeforces.com/problemset/problem/803/A>

思路：

代码

```
#
import sys
n,k=[int(i) for i in input().split()]
s=[n*['0'] for i in range(n)]
if(k>n*n):
    print(-1)
    sys.exit()
heng=0
zong=0
while(k>0):
    if(heng==zong):
        k-=1
        s[heng][zong]='1'

    elif(heng!=zong and k!=1):
        k-=2
        s[heng][zong]='1'
        s[zong][heng]='1'
        zong+=1
    if(zong==n):
        heng+=1
        zong=heng
for i in range(n):
    h=str(s[i])
    print(' '.join(s[i]))
```

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		
230359472	Practice: Lysinex	<a href="#">803A</a> - 23	PyPy 3-64	Accepted	62 ms	1740 KB	2023-10-29 14:43:38	2023-10-29 14:43:38		<a href="#">Compare</a>

→ Source

Copy

```
import sys
n,k=[int(i) for i in input().split()]
s=[n*['0'] for i in range(n)]
if(k>n*n):
    print(-1)
    sys.exit()
heng=0
zong=0
while(k>0):
    if(heng==zong):
        k-=1
        s[heng][zong]='1'

    elif(heng!=zong and k!=1):
        k-=2
        s[heng][zong]='1'
        s[zong][heng]='1'
        zong+=1
    if(zong==n):
        heng+=1
        zong=heng
for i in range(n):
    h=str(s[i])
    print(' '.join(s[i]))
```

## 1793C. Dora and Search

constructive algorithms, data structures, two pointers, 1200,

<https://codeforces.com/problemset/problem/1793/C>

思路：

代码

```
#
n=int(input())
for i in range(n):
    m=int(input())
    s=[int(i) for i in input().split()]
    l=0
    r=m-1
    mn=1
    ms=m
    while(l<r):
        if(s[l]==mn):
            l+=1
            mn+=1
        elif(s[l]==ms):
            ms-=1
            l+=1
        elif(s[r]==mn):
            mn+=1
            r-=1
        elif(s[r]==ms):
            ms-=1
            r-=1
        else:
            break
    if(l<r):
        print(f"{l+1} {r+1}")
    else:
        print(-1)
```

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

#	Author	Problem	Lang	Verdict	Time	Memory	Sent	Judged		
230371389	Practice: Lysinex	<a href="#">1793C</a> - 44	PyPy 3-64	Accepted	311 ms	17228 KB	2023-10-29 16:14:27	2023-10-29 16:14:27	★	<a href="#">Compare</a>

→ [Source](#)

[Copy](#)

```
n=int(input())
for i in range(n):
    m=int(input())
    s=[int(i) for i in input().split()]
    l=0
    r=m-1
    mn=1
    ms=m
    while(l<r):
        if(s[l]==mn):
            l+=1
            mn+=1
        elif(s[l]==ms):
            ms-=1
            l+=1
        elif(s[r]==mn):
            mn+=1
            r-=1
        elif(s[r]==ms):
            ms-=1
            r-=1
        else:
            break
    if(l<r):
        print(f"{l+1} {r+1}")
    else:
        print(-1)
```

## 2. 选做题目

### 368B. Sereja and Suffixes

data structures, dp, 1100

<https://codeforces.com/problemset/problem/368/B>

思路：

代码

```
#
n,k=[int(i) for i in input().split()]
s=[int(i) for i in input().split()]
o=(n+1)*[0]
a=100001*[0]
for i in range(n-1,-1,-1):
    if(a[s[i]]!=0):
        o[i]=o[i+1]
    else:
        o[i]=o[i+1]+1
        a[s[i]]+=1
for i in range(k):
    c=int(input())
    print(o[c-1])
```

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	
230646178	Practice: Lysinx	<a href="#">368B</a> - 18	PyPy 3-64	Accepted	967 ms	14724 KB	2023-10-31 11:47:00	2023-10-31 11:47:00	★ <a href="#">Compare</a>

→ Source

Copy

```
n,k=[int(i) for i in input().split()]
s=[int(i) for i in input().split()]
o=(n+1)*[0]
a=100001*[0]
for i in range(n-1, -1, -1):
    if(a[s[i]]!=0):
        o[i]=o[i+1]
    else:
        o[i]=o[i+1]+1
        a[s[i]]+=1
for i in range(k):
    c=int(input())
    print(o[c-1])
```

## 1764C. Doremy's City Construction

graphs, greedy, 1400

<https://codeforces.com/problemset/problem/1764/C>

思路：

代码

```
#
```

代码运行截图 == (AC代码截图，至少包含有"Accepted") ==

## 3. 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“每日选做”中每天推出的32题目、CF、LeetCode、洛谷等网站题目。==

本周最大的收获属于是：学会了双指针，明白了什么叫做“以空间换时间”。对贪心算法的了解进一步加深。

说实话，第四题一开始真的卡了好久，最后实在忍不住，去网上看了题解，才发现这个题要用到双指针，于是就借这个题把双指针搞懂了。以后遇到不会的题，很有可能是碰到了我没遇到过的算法，卡了一会儿就应该去看看题解，不应该死磕。

第五题的情况差不多。一开始的判据是`s[i] in a`，一直tle 直到看到网上的题解说用空间换时间。才明白应该怎么写。（虽然用了pypy还是低空掠过hhh）

第六题没啥思路...就没有写了