

# Assignment #3: March月考

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Updated 1537 GMT+8 March 6, 2024

2024 spring, Compiled by ==同学的姓名、院系==

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## 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) 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: win10

Python编程环境: Spyder IDE 5.2.2

C/C++编程环境:

## 1. 题目

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### 02945: 拦截导弹

<http://cs101.openjudge.cn/practice/02945/>

思路: 和上学期学的一维数组非常的相近

## 代码

```
n = int(input())
a = list (map(int,input().split()))
dp =[1]*n
for i in range(n-1,-1,-1):
    maxd = 1
    for j in range(n-1,i,-1):
        if a[i] >= a[j] and dp[j]+1 >= maxd:
            maxd = dp[j] + 1
    dp[i] = maxd
print(max(dp))
```

代码运行截图 == (至少包含有"Accepted") ==

状态: Accepted

源代码

```
n = int(input())
a = list (map(int,input().split()))
dp =[1]*n
for i in range(n-1,-1,-1):
    maxd = 1
    for j in range(n-1,i,-1):
        if a[i] >= a[j] and dp[j]+1 >= maxd:
            maxd = dp[j] + 1
    dp[i] = maxd
print(max(dp))
```

基本信息

#: 44170339  
题目: 02945  
提交人: 23n2300012140(zyt)  
内存: 3636kB  
时间: 22ms  
语言: Python3  
提交时间: 2024-03-11 16:49:37

## 04147:汉诺塔问题(Tower of Hanoi)

<http://cs101.openjudge.cn/practice/04147>

思路: 采取了递归的方法, 但是看了答案的代码后发现简洁许多

## 代码

```
def amove(numd,qi,zh):
    print('{}: {}->{}'.format(numd,qi,zh))
def tmove(tnum,yi,er,san):
    if tnum == 1:
        amove(1,yi,san)
    else:
        tmove(tnum-1,yi,san,er)
        amove(tnum,yi,san)
        tmove(tnum-1,er,yi,san)
a,b,c,d = input().split()
tmove(int(a),b,c,d)
```

代码运行截图 == (至少包含有"Accepted") ==

状态: Accepted

源代码

```
def amove(numd,qi,zh):
    print('{}: {}->{}'.format(numd,qi,zh))
def tmove(tnum,yi,er,san):
    if tnum == 1:
        amove(1,yi,san)
    else:
        tmove(tnum-1,yi,san,er)
        amove(tnum,yi,san)
        tmove(tnum-1,er,yi,san)
a,b,c,d = input().split()
tmove(int(a),b,c,d)
```

基本信息

#: 44169394  
题目: 04147  
提交人: 23n2300012140(zyt)  
内存: 3524kB  
时间: 23ms  
语言: Python3  
提交时间: 2024-03-11 15:58:25

## 03253: 约瑟夫问题No.2

<http://cs101.openjudge.cn/practice/03253>

思路：用整除来完成循环，但是需要考虑特殊边界

## 代码

```
import sys
while True:
    n,p,m = map(int,input().split())
    if n == 0 and m == 0 and p == 0:
        sys.exit()
    a = [i+1 for i in range(n)]
    b = []
    while a != []:
        b.append(a[(p+m-1)%n-1])
        a.pop((p+m-1)%n-1)
        p = (p+m-1) % n
        n -= 1
        if p == 0:
            p = 1
    b = [str(j) for j in b]
    print(','.join(b))
```

代码运行截图 == (AC代码截图，至少包含有"Accepted") ==

状态: Accepted

源代码

```
import sys
while True:
    n,p,m = map(int,input().split())
    if n == 0 and m == 0 and p == 0:
        sys.exit()
    a = [i+1 for i in range(n)]
    b = []
    while a != []:
        b.append(a[(p+m-1)%n-1])
        a.pop((p+m-1)%n-1)
        p = (p+m-1) % n
        n -= 1
        if p == 0:
            p = 1
    b = [str(j) for j in b]
    print(' '.join(b))
```

基本信息

#: 44169068  
题目: 03253  
提交人: 23n2300012140(zyt)  
内存: 3636kB  
时间: 20ms  
语言: Python3  
提交时间: 2024-03-11 15:31:09

## 21554:排队做实验 (greedy)v0.2

<http://cs101.openjudge.cn/practice/21554>

思路：使用列表排序后用遍历和循环依次累加

### 代码

```
n = int(input())
a = list(map(int,input().split()))
b = sorted(a)
c = [[] for _ in range(n)]
d = []
tim = 0
for i in range(n):
    j = 0
    while j <= n:
        if a[j] == b[i]:
            c[j] = [a[j],i]
            tim += a[j]*(n-i-1)
            d.append(j+1)
            a[j] = -1
            break
        else:
            j += 1
d = [str(m) for m in d]
print(' '.join(d))
print("{:.2f}".format(tim/n))
```

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

状态: Accepted

源代码

```
n = int(input())
a = list(map(int, input().split()))
b = sorted(a)
c = [[] for _ in range(n)]
d = []
tim = 0
for i in range(n):
    j = 0
    while j <= n:
        if a[j] == b[i]:
            c[j] = [a[j], i]
            tim += a[j] * (n - i - 1)
            d.append(j + 1)
            a[j] = -1
            break
        else:
            j += 1
d = [str(m) for m in d]
print(' '.join(d))
print("{:.2f}".format(tim/n))
```

基本信息

#: 44127729  
题目: 21554  
提交人: 23n2300012140(zyt)  
内存: 3668kB  
时间: 26ms  
语言: Python3  
提交时间: 2024-03-09 10:42:32

19963:买学区房

<http://cs101.openjudge.cn/practice/19963>

思路: 关于中位数的处理反复出错了几次

代码

```
n = int(input())
pairs = [i[1:-1] for i in input().split()]
distances = [sum(map(int, i.split(','))) for i in pairs]
prices = [int(i) for i in input().split()]
price = sorted(prices)
nices = [distances[i]/prices[i] for i in range(n)]
nice = sorted(nices)

if n % 2 == 1:
    mnice = nice[n//2]
    mprice = price[n//2]
else:
    mnice = (nice[n//2-1] + nice[n//2])/2
    mprice = (price[n//2-1] + price[n//2])/2
a = 0
for j in range(n):
    if prices[j] < mprice and nices[j] > mnice:
        a += 1
print(a)
```

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

状态: Accepted

基本信息

#: 44168556

题目: 19963

提交人: 23n2300012140(zyt)

内存: 4260kB

时间: 26ms

语言: Python3

提交时间: 2024-03-11 14:35:16

源代码

```
n = int(input())
pairs = [i[1:-1] for i in input().split()]
distances = [sum(map(int,i.split(','))) for i in pairs]
prices = [int(i) for i in input().split()]
price = sorted(prices)
nices = [distances[i]/prices[i] for i in range(n)]
nice = sorted(nices)

if n % 2 == 1:
    mnice = nice[n//2]
    mprice = price[n//2]
else:
    mnice = (nice[n//2-1]+nice[n//2])/2
    mprice = (price[n//2-1]+price[n//2])/2
a = 0
for j in range(n):
    if prices[j] < mprice and nices[j] > mnice:
        a += 1
print(a)
```

## 27300: 模型整理

<http://cs101.openjudge.cn/practice/27300>

思路: 试图使用答案中的defaultdict方法, 但是因为语法问题做了很多遍修改

代码

```
from collections import defaultdict
n = int(input())
a = defaultdict(list)
for _ in range(n):
    name,num = input().split('-')
    if num[-1] == 'M':
        a[name].append((num,float(num[:-1])/1000))
    else:
        a[name].append((num,float(num[:-1])))
b = sorted(a)
for i in b:
    c = sorted(a[i],key = lambda x:x[1])
    d = ','.join([j[0] for j in c])
    print(f'{i}: {d}')
```

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
n = int(input())
a = defaultdict(list)
for _ in range(n):
    name,num = input().split('-')
    if num[-1] == 'M':
        a[name].append((num,float(num[:-1])/1000))
    else:
        a[name].append((num,float(num[:-1])))
b = sorted(a)
for i in b:
    c = sorted(a[i],key = lambda x:x[1])
    d = ','.join([j[0] for j in c])
    print(f'{i}: {d}')
```

基本信息

#: 44168894

题目: 27300

提交人: 23n2300012140(zyt)

内存: 3660kB

时间: 22ms

语言: Python3

提交时间: 2024-03-11 15:17:11

## 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。==

对上学期所学的一些算法有些遗忘，要多加回顾。

题解所给出的代码比自己的要简洁很多。