Assignment #3: March月考

Updated 1537 GMT+8 March 6, 2024

2024 spring, Complied by 田济维

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

（python pycharm）

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

02945: 拦截导弹

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

思路：

代码

```python
#
n = int(input())
Height = list(map(int,input().split()))
dp = [0 for i in range(n)]
dp[0] = 1
for i in range(1,n):
    maxn = 1
    for j in range(i):
        if Height[j]>=Height[i]:
            maxn = max(dp[j]+1,maxn)
    dp[i] = maxn
print(max(dp))
```

代码运行截图 （至少包含有"Accepted"）

状态: Accepted

源代码

```python
n = int(input())
Height = list(map(int,input().split()))
dp = [0 for i in range(n)]
dp[0] = 1
for i in range(1,n):
    maxn = 1
    for j in range(i):
        if Height[j]>=Height[i]:
            maxn = max(dp[j]+1,maxn)
    dp[i] = maxn
print(max(dp))
```

基本信息

#: 44120799
题目: 02945
提交人: 23n2300011503
内存: 3588kB
时间: 23ms
语言: Python3
提交时间: 2024-03-08 19:06:44

04147:汉诺塔问题(Tower of Hanoi)

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

思路:

代码

```python
#
def hannuo(k,a,b,c):
    if k == 0:
        return
    hannuo(k-1,a,c,b)
    print(f"{k}:{a}->{c}")
    hannuo(k-1,b,a,c)

n,a,b,c = input().split()
hannuo(int(n),a,b,c)
```

代码运行截图 （至少包含有"Accepted"）

状态：Accepted

源代码

```
def hannuo(k,a,b,c):
    if k == 0:
        return
    hannuo(k-1,a,c,b)
    print(f"{k}:{a}->{c}")
    hannuo(k-1,b,a,c)

n,a,b,c = input().split()
hannuo(int(n),a,b,c)
```

基本信息

#:	44121050
题目:	04147
提交人:	23n2300011503
内存:	3512kB
时间:	20ms
语言:	Python3
提交时间:	2024-03-08 19:17:50

03253: 约瑟夫问题No.2

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

思路：

代码

```
#
from collections import deque
while True:
    n,p,m = map(int,input().split())
    if n==0:
        break
    boy = deque()
    result = []
    for i in range(n):
        boy.append((p+i-1)%n+1)
    while boy:
        for i in range(m-1):
            boy.append(boy.popleft())
        result.append(boy.popleft())

    for i in range(n-1):

        print(result[i],end = "")
        print(",", end="")
    print(result[-1])
```

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 deque
while True:
    n,p,m = map(int,input().split())
    if n==0:
        break
    boy = deque()
    result = []
    for i in range(n):
        boy.append((p+i-1)%n+1)
    while boy:
        for i in range(m-1):
            boy.append(boy.popleft())
        result.append(boy.popleft())

    for i in range(n-1):

        print(result[i],end = "")
        print(",", end="")
    print(result[-1])
```

基本信息

#: 44121345
题目: 03254
提交人: 23n2300011503
内存: 3644kB
时间: 20ms
语言: Python3
提交时间: 2024-03-08 19:30:5

21554:排队做实验 (greedy)v0.2

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

思路：

代码

```
#
n = int(input())
Time = list(map(int,input().split()))
Order = list(map(int,input().split()))
cnt = 0
for i in range(n):
    cnt+=(n-i-1)*Time[Order[i]-1]
print("%.2f"%(cnt/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())
Time = list(map(int,input().split()))
Order = list(map(int,input().split()))
cnt = 0
for i in range(n):
    cnt+=(n-i-1)*Time[Order[i]-1]
print("%.2f"%(cnt/n))
```

基本信息

#: 43389252
题目: 21728
提交人: 23n2300011503
内存: 3632kB
时间: 24ms
语言: Python3
提交时间: 2023-12-26 23:45:32

19963:买学区房

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

思路：

代码

```
#
def zhong(seq):
    m = len(seq)
    if m%2 ==0:
        return (seq[m//2-1]+seq[m//2])/2
    else:
        return seq[m//2]
n = int(input())
pairs = [i[1:-1] for i in input().split()]
distances = [ sum(map(int,i.split(','))) for i in pairs]
money = list(map(int,input().split()))
xingjia = []
for x in range(n):
    if money[x]!=0:
        xingjia.append(distances[x]/money[x])
    else:
        xingjia.append(100000000000)
rx = sorted(xingjia)
rm = sorted(money)
xz = zhong(rx)
mz = zhong(rm)
cnt = 0
for x in range(n):
    if money[x]<mz and xingjia[x]>xz:
        cnt+=1
print(cnt)
```

代码运行截图 （AC代码截图，至少包含有"Accepted"）

状态: Accepted

源代码

```
def zhong(seq):
    m = len(seq)
    if m%2 ==0:
        return (seq[m//2-1]+seq[m//2])/2
    else:
        return seq[m//2]
n = int(input())
pairs = [i[1:-1] for i in input().split()]
distances = [ sum(map(int,i.split(','))) for i in pairs]
money = list(map(int,input().split()))
xingjia = []
for x in range(n):
    if money[x]!=0:
        xingjia.append(distances[x]/money[x])
    else:
        xingjia.append(100000000000)
rx = sorted(xingjia)
rm = sorted(money)
xz = zhong(rx)
mz = zhong(rm)
cnt = 0
for x in range(n):
    if money[x]<mz and xingjia[x]>xz:
        cnt+=1
print(cnt)
```

基本信息

#:	42991176
题目:	M19963
提交人:	23n2300011503
内存:	4212kB
时间:	24ms
语言:	Python3
提交时间:	2023-12-07 16:13:54

27300: 模型整理

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

思路:

代码

```
#
def parse(para):
    a = para[-1]
    b = float(para[:-1])
    if a == "M":
        return b
    return 1000*b

from collections import defaultdict
n = int(input())
s = defaultdict(list)
for i in range(n):
    x = input().split("-")
    type = x[0]

    s[type].append(x[1])

m = list(s.keys())
m.sort()
for x in m:
    print(x+":",end = " ")
    number = [y for y in s[x]]
    number = sorted(number,key = lambda x:parse(x))
```

```
    for y in number[:-1]:
        print(y,end = ", ")
    y = number[-1]
    print(y)
```

代码运行截图 （AC代码截图，至少包含有"Accepted"）

状态：Accepted

源代码

```
def parse(para):
    a = para[-1]
    b = float(para[:-1])
    if a == "M":
        return b
    return 1000*b

from collections import defaultdict
n = int(input())
s = defaultdict(list)
for i in range(n):
    x = input().split("-")
    type = x[0]

    s[type].append(x[1])

m = list(s.keys())
m.sort()
for x in m:
    print(x+":",end = " ")
    number = [y for y in s[x]]
    number = sorted(number,key = lambda x:parse(x))

    for y in number[:-1]:
        print(y,end = ", ")
    y = number[-1]
    print(y)
```

基本信息

#: 44121921
题目: 27300
提交人: 23n2300011503
内存: 3648kB
时间: 21ms
语言: Python3
提交时间: 2024-03-08 19:58:00

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。

逐渐有难度了