Assignment #4: T-primes + 贪心

Updated 0337 GMT+8 Oct 15, 2024

2024 fall, Complied by 佟永鑫 元培学院

说明：

1）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。

1. 题目

34B. Sale

greedy, sorting, 900, https://codeforces.com/problemset/problem/34/B

思路：

只有负价格能赚钱：找出负价格排序取前m个

代码

```
#
def Sale(n, m, prices):
    negative_prices = [price for price in prices if price < 0]
    negative_prices.sort()
    max_earn = sum(-price for price in negative_prices[:m])
    return max_earn
n, m = map(int, input().split())
prices = list(map(int, input().split()))
print(Sale(n, m, prices))
```

代码运行截图 （至少包含有"Accepted"）

160A. Twins

greedy, sortings, 900, https://codeforces.com/problemset/problem/160/A

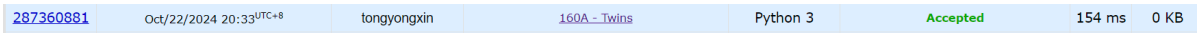
思路：

优先拿面值大的

代码

```
def Coins(n, coins):
    total_value = sum(coins)
    coins.sort(reverse=True)
    sum_values = 0
    count = 0
    for coin in coins:
        sum_values += coin
        count += 1
        if sum_values > 0.5*total_value :
            break
    return count

n = int(input())
coins = list(map(int, input().split()))
result = Coins(n, coins)
print(result)
```

代码运行截图 ==（至少包含有"Accepted"）==



287360881	Oct/22/2024 20:33 UTC+8	tongyongxin	160A - Twins	Python 3	Accepted	154 ms	0 KB

1879B. Chips on the Board

constructive algorithms, greedy, 900, https://codeforces.com/problemset/problem/1879/B

思路：

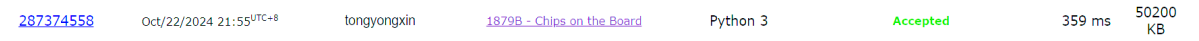
要么每行有一个，要么每列有一个，比较最小值。（不能写完整的矩阵，否则超时）

代码

```
def Chips_on_the_Board(n, a, b):
    minA = min(a)
    minB = min(b)
    case1_total = sum(minB + ai for ai in a)
    case2_total = sum(minA + bi for bi in b)
    return min(case1_total, case2_total)
t = int(input())
results = []
for _ in range(t):
    n = int(input())
    a = list(map(int, input().split()))
    b = list(map(int, input().split()))
```

```
    results.append(Chips_on_the_Board(n, a, b))
for res in results:
    print(res)
```

代码运行截图 （至少包含有"Accepted"）



287374558	Oct/22/2024 21:55 UTC+8	tongyongxin	1879B - Chips on the Board	Python 3	Accepted	359 ms	50200 KB

158B. Taxi

*special problem, greedy, implementation, 1100, https://codeforces.com/problemset/problem/158/B

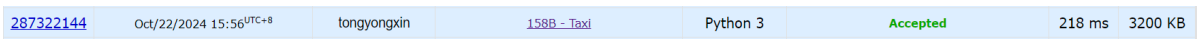
思路：

1,2,3,4分类讨论

代码

```
def Taxi(n, groups):
    count = [0] * 5
    for size in groups:
        count[size] += 1
    taxis = 0
    taxis += count[4]
    taxis += count[3]
    count[1] = max(0, count[1] - count[3])
    taxis += count[2] // 2
    if count[2] % 2 == 1:
        taxis += 1
        count[1] = max(0, count[1] - 2)
    taxis += (count[1]+ 3)// 4

    return taxis

n = int(input())
groups = list(map(int, input().split()))
result = Taxi(n, groups)
print(result)
```

代码运行截图 （至少包含有"Accepted"）



287322144	Oct/22/2024 15:56 UTC+8	tongyongxin	158B - Taxi	Python 3	Accepted	218 ms	3200 KB

*230B. T-primes（选做）

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

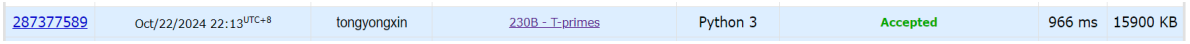
思路：

埃氏筛找质数，T-质数x=1*x=p^2

代码

```
def sieve_of_eratosthenes(max_n):
    is_prime = [True] * (max_n + 1)
    p = 2
    while (p * p <= max_n):
        if (is_prime[p]):
            for i in range(p * p, max_n + 1, p):
                is_prime[i] = False
        p += 1
    return [p for p in range(2, max_n + 1) if is_prime[p]]

def generate_t_primes(n):
    primes = sieve_of_eratosthenes(int(n**0.5))
    t_primes = {p * p for p in primes}
    return t_primes

def is_t_prime(numbers):
    t_primes = generate_t_primes(max(numbers))
    result = []
    for x in numbers:
        if x in t_primes:
            result.append("YES")
        else:
            result.append("NO")
    return result

n = int(input())
numbers = list(map(int, input().split()))

results = is_t_prime(numbers)
for res in results:
    print(res)
```

代码运行截图 （至少包含有"Accepted"）



287377589	Oct/22/2024 22:13UTC+8	tongyongxin	230B - T-primes	Python 3	Accepted	966 ms	15900 KB

*12559: 最大最小整数 （选做）

greedy, strings, sortings, http://cs101.openjudge.cn/practice/12559

思路：

代码

```
from functools import cmp_to_key

def compare_max(x, y):
    if x + y > y + x:
        return -1
    else:
        return 1

def compare_min(x, y):
    if x + y < y + x:
        return -1
    else:
        return 1

def find_max_min_numbers(n, numbers):
    numbers = list(map(str, numbers))
    max_number = ''.join(sorted(numbers, key=cmp_to_key(compare_max)))
    min_number = ''.join(sorted(numbers, key=cmp_to_key(compare_min)))
    return max_number, min_number


n = int(input())
numbers = list(map(int, input().split()))


max_num, min_num = find_max_min_numbers(n, numbers)


print(max_num, min_num)
```

代码运行截图 （至少包含有"Accepted"）

状态：Accepted

源代码

```python
from functools import cmp_to_key

def compare_max(x, y):
    if x + y > y + x:
        return -1
    else:
        return 1

def compare_min(x, y):
    if x + y < y + x:
        return -1
    else:
        return 1

def find_max_min_numbers(n, numbers):
    numbers = list(map(str, numbers))
    max_number = ''.join(sorted(numbers, key=cmp_to_key(compare_max)))
    min_number = ''.join(sorted(numbers, key=cmp_to_key(compare_min)))
    return max_number, min_number


n = int(input())
numbers = list(map(int, input().split()))


max_num, min_num = find_max_min_numbers(n, numbers)


print(max_num, min_num)
```

基本信息

#: 46659454
题目: 12559
提交人: 佟永鑫
内存: 3680kB
时间: 25ms
语言: Python3
提交时间: 2024-10-22 16:05:40

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“计概2024fall每日选做”、CF、LeetCode、洛谷等网站题目。

用chatgpt了解了埃氏筛的python写法和强大的cmp_to_key

贪心问题还需要多刷题练习