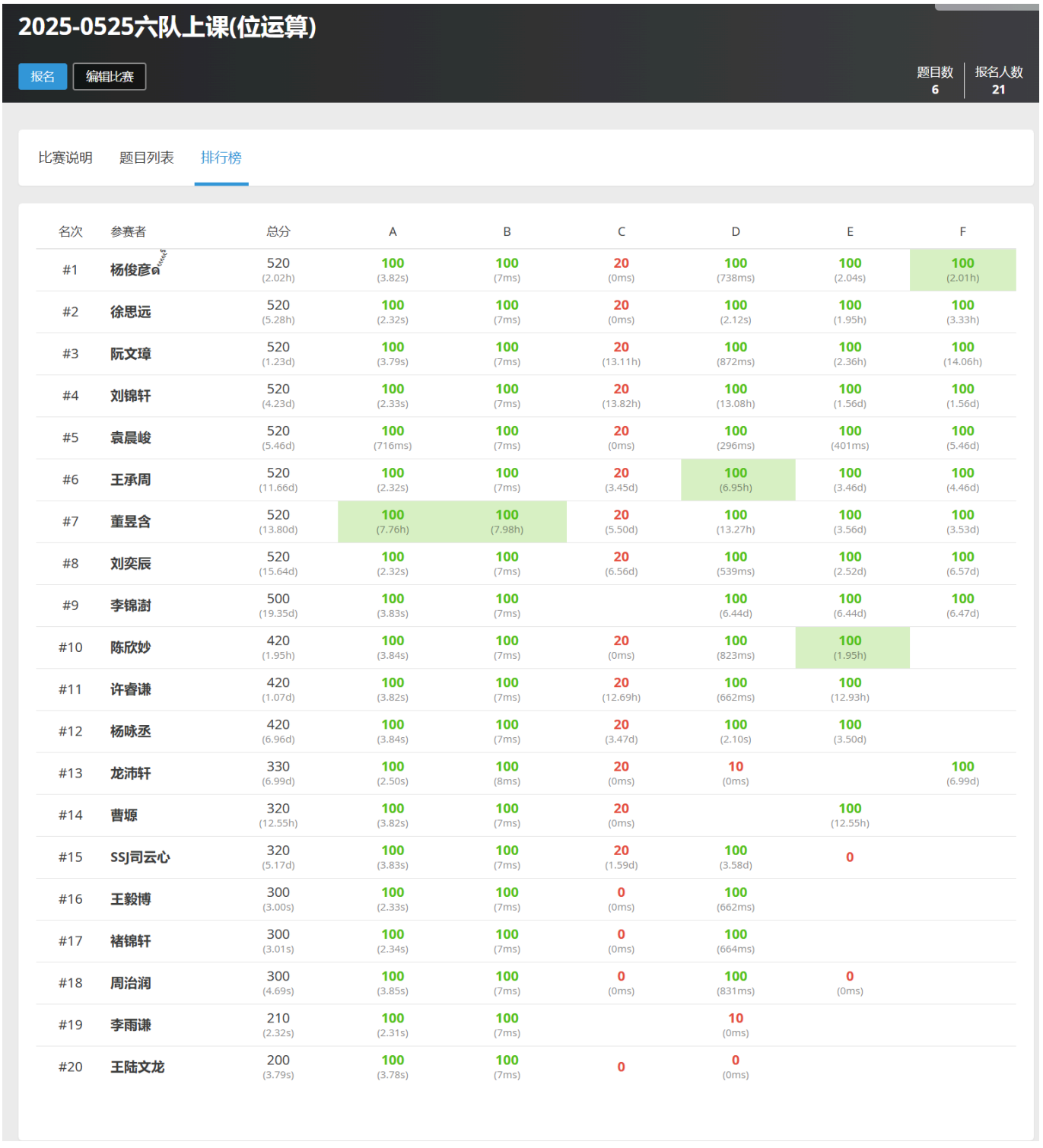
# 综合混练

## 人员

王毅博、王承周、司云心、曹塬、阮文璋 到课

## 上周作业检查

https://www.luogu.com.cn/contest/248672



**2025-0525六队上课(位运算)**

报名 编辑比赛

题目数 6 | 报名人数 21

比赛说明 题目列表 排行榜

| 名次 | 参赛者 | 总分 | A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|---|
| #1 | 杨俊彦 | 520 (2.02h) | 100 (3.82s) | 100 (7ms) | 20 (0ms) | 100 (738ms) | 100 (2.04s) | 100 (2.01h) |
| #2 | 徐思远 | 520 (5.28h) | 100 (2.32s) | 100 (7ms) | 20 (0ms) | 100 (2.12s) | 100 (1.95h) | 100 (3.33h) |
| #3 | 阮文璋 | 520 (1.23d) | 100 (3.79s) | 100 (7ms) | 20 (13.11h) | 100 (872ms) | 100 (2.36h) | 100 (14.06h) |
| #4 | 刘锦轩 | 520 (4.23d) | 100 (2.33s) | 100 (7ms) | 20 (13.82h) | 100 (13.08h) | 100 (1.56d) | 100 (1.56d) |
| #5 | 袁晨峻 | 520 (5.46d) | 100 (716ms) | 100 (7ms) | 20 (0ms) | 100 (296ms) | 100 (401ms) | 100 (5.46d) |
| #6 | 王承周 | 520 (11.66d) | 100 (2.32s) | 100 (7ms) | 20 (3.45d) | 100 (6.95h) | 100 (3.46d) | 100 (4.46d) |
| #7 | 董昱含 | 520 (13.80d) | 100 (7.76h) | 100 (7.98h) | 20 (5.50d) | 100 (13.27h) | 100 (3.56d) | 100 (3.53d) |
| #8 | 刘奕辰 | 520 (15.64d) | 100 (2.32s) | 100 (7ms) | 20 (6.56d) | 100 (539ms) | 100 (2.52d) | 100 (6.57d) |
| #9 | 李锦澍 | 500 (19.35d) | 100 (3.83s) | 100 (7ms) |  | 100 (6.44d) | 100 (6.44d) | 100 (6.47d) |
| #10 | 陈欣妙 | 420 (1.95h) | 100 (3.84s) | 100 (7ms) | 20 (0ms) | 100 (823ms) | 100 (1.95h) |  |
| #11 | 许睿谦 | 420 (1.07d) | 100 (3.82s) | 100 (7ms) | 20 (12.69h) | 100 (662ms) | 100 (12.93h) |  |
| #12 | 杨咏丞 | 420 (6.96d) | 100 (3.84s) | 100 (7ms) | 20 (3.47d) | 100 (2.10s) | 100 (3.50d) |  |
| #13 | 龙沛轩 | 330 (6.99d) | 100 (2.50s) | 100 (8ms) | 20 (0ms) | 10 (0ms) |  | 100 (6.99d) |
| #14 | 曹塬 | 320 (12.55h) | 100 (3.82s) | 100 (7ms) | 20 (0ms) |  | 100 (12.55h) |  |
| #15 | SSJ司云心 | 320 (5.17d) | 100 (3.83s) | 100 (7ms) | 20 (1.59d) | 100 (3.58d) | 0 |  |
| #16 | 王毅博 | 300 (3.00s) | 100 (2.33s) | 100 (7ms) | 0 (0ms) | 100 (662ms) |  |  |
| #17 | 褚锦轩 | 300 (3.01s) | 100 (2.34s) | 100 (7ms) | 0 (0ms) | 100 (664ms) |  |  |
| #18 | 周治润 | 300 (4.69s) | 100 (3.85s) | 100 (7ms) | 0 (0ms) | 100 (831ms) | 0 (0ms) |  |
| #19 | 李雨谦 | 210 (2.32s) | 100 (2.31s) | 100 (7ms) |  | 10 (0ms) |  |  |
| #20 | 王陆文龙 | 200 (3.79s) | 100 (3.78s) | 100 (7ms) | 0 | 0 (0ms) |  |  |

## 作业

https://www.luogu.com.cn/contest/249994 (课上讲了 A ~ D 题, 课后作业是 E 题)

# 课堂表现

今天课上给同学们出了 2 道 dp 题, 同学们课上做起来有点吃力, 课后要再好好复习复习这 2 道题。

# 课堂内容

### P12141 [蓝桥杯 2025 省 A] 红黑树

第 n 行第 k 个点的颜色, 跟第 n-1 行第 (k+1)/2 个点的颜色有关

进行递归搜索即可

```
#include <bits/stdc++.h>

using namespace std;

int dfs(int n, int k) {  // 求第 n 行的第 k 列
  if (n==1 && k==1) return 1;
  if (n == 2) {
    if (k == 1) return 1;
    else return 0;
  }

  if (k%2 == 0) return 1 - dfs(n-1, (k+1)/2);
  else return dfs(n-1, (k+1)/2);
}

void solve() {
  int n, k; cin >> n >> k;
  int value = dfs(n, k);
  if (value == 0) cout << "BLACK" << endl;
  else cout << "RED" << endl;
}

int main()
{
  int T; cin >> T;
  while (T -- ) solve();
  return 0;
}
```

### P1934 封印

```
f[i]: 1->i 最小花费
答案: f[n]
从左往右求 f[i]

for (int i = 1; i <= n; i++) {
```

```
    求 f[i] ?
    枚举 i 前面的 j: 先从1到j-1花费最小, 再从j到i
}
```

```cpp
#include <bits/stdc++.h>

using namespace std;

typedef long long LL;
const int maxn = 10000 + 5;
int w[maxn], p[maxn];
LL f[maxn];

int get_sum(int l, int r) { return (l<=r ? p[r]-p[l-1] : 0); }

int main()
{
  int n, t; cin >> n >> t;
  for (int i = 1; i <= n; ++i) cin >> w[i], p[i] = p[i-1] + w[i];

  memset(f, 0x3f, sizeof(f));
  f[0] = 0;
  for (int i = 1; i <= n; ++i) {
    f[i] = f[i-1] + (LL)w[i]*n*n;
    for (int j = 1; j < i; j++) {
      if (w[j]+w[i] <= t) f[i] = min(f[i], f[j-1] + ((LL)w[j]+w[i])*get_sum(j,i));
    }
  }
  cout << f[n] << endl;
  return 0;
}
```

**P2193 HXY和序列**

f[i][j]: 以第 i 个数结尾, 第 i 个数填 j 时, 一共有多少方案

f[i][j] 可以由所有的 f[i-1][k] 转移而来 (k 需要是 i 的因数)

```cpp
#include <bits/stdc++.h>

using namespace std;

typedef long long LL;
const int maxn = 2e3 + 5;
const int mod = 1e9 + 7;
int f[maxn][maxn];
vector<int> vec[maxn];

int main()
```

```
{
  for (int i = 1; i < maxn; ++i) {
    for (int j = 1; j <= i; ++j) {
      if (i%j == 0) vec[i].push_back(j);
    }
  }

  int limit, n; cin >> limit >> n;

  f[0][1] = 1;
  for (int i = 1; i <= n; ++i) {
    for (int j = 1; j <= limit; ++j) {
      for (int k : vec[j]) {
        if (j%k == 0) f[i][j] = (f[i][j] + f[i-1][k]) % mod;
      }
    }
  }

  int res = 0;
  for (int i = 1; i <= limit; ++i) res = (res + f[n][i]) % mod;
  cout << res << endl;
  return 0;
}
```

**P2207 Photo**

输入 k 组关系, 每组是 l,r 关系不好, 所以我们应该在 [l,r-1] 区间中挑一个点画一条隔断线

那么原问题的多组关系, 现在就转变为了: 有多个区间, 我们要选尽可能少的点, 保证每个区间内都至少包含一个点

做法跟 凌乱的yyy 这道题一致, 按右端点排序, 然后从左往右扫一遍即可

```
#include <bits/stdc++.h>

using namespace std;

const int maxn = 1000 + 5;
struct node {
  int l, r;
  bool operator < (const node& p) const { return r < p.r; }
} w[maxn];

int main()
{
  int limit, n; cin >> limit >> n;
  for (int i = 1; i <= n; ++i) {
    cin >> w[i].l >> w[i].r;
    if (w[i].l > w[i].r) swap(w[i].l, w[i].r);
    --w[i].r;
  }
```

```
  sort(w+1, w+n+1);

  int res = 0, rmax = -1;
  for (int i = 1; i <= n; ++i) {
    if (w[i].l > rmax) ++res, rmax = w[i].r;
  }
  cout << res+1 << endl;
  return 0;
}
```

### P1803 凌乱的yyy / 线段覆盖

```
#include <bits/stdc++.h>

using namespace std;

const int maxn = 1e6 + 5;
struct node {
    int l, r;
} w[maxn];

bool cmp(node p, node q) {
    return p.r < q.r;
}

int main()
{
    int n; cin >> n;
    for (int i = 1; i <= n; ++i) cin >> w[i].l >> w[i].r;
    sort(w+1, w+n+1, cmp);

    int last = -1, res = 0;
    for (int i = 1; i <= n; ++i) {
        if (w[i].l >= last) {
            ++res;
            last = w[i].r;
        }
    }

    cout << res << endl;
    return 0;
}
```