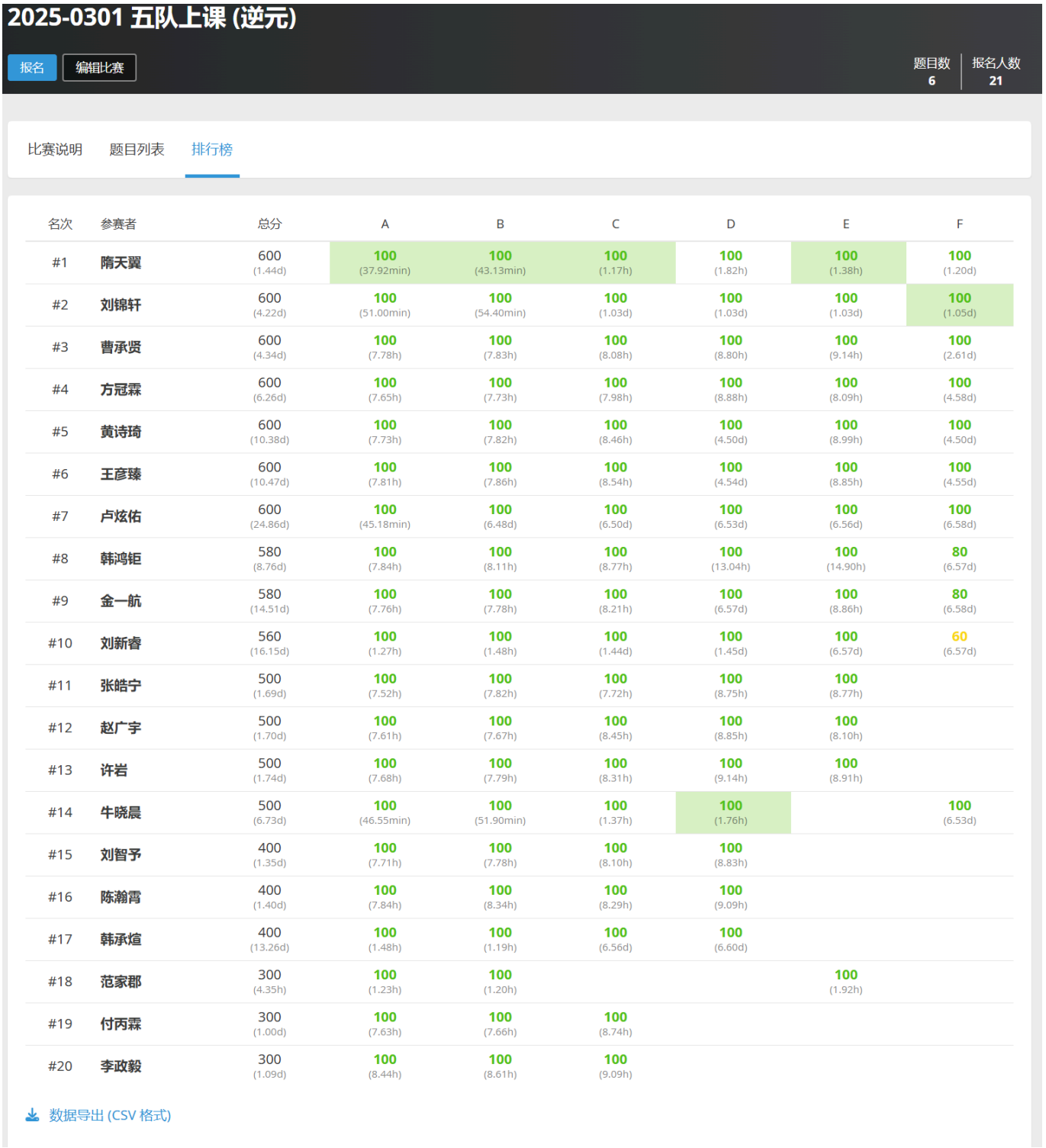
树状数组

人员

卢炫佑、隋天翼、刘新睿、刘锦轩、牛晓晨、韩承煊 到课

上周作业检查

上周作业链接: https://www.luogu.com.cn/contest/233402



2025-0301 五队上课 (逆元)

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	隋天翼	600 (1.44d)	100 (37.92min)	100 (43.13min)	100 (1.17h)	100 (1.82h)	100 (1.38h)	100 (1.20d)
#2	刘锦轩	600 (4.22d)	100 (51.00min)	100 (54.40min)	100 (1.03d)	100 (1.03d)	100 (1.03d)	100 (1.05d)
#3	曹承贤	600 (4.34d)	100 (7.78h)	100 (7.83h)	100 (8.08h)	100 (8.80h)	100 (9.14h)	100 (2.61d)
#4	方冠霖	600 (6.26d)	100 (7.65h)	100 (7.73h)	100 (7.98h)	100 (8.88h)	100 (8.09h)	100 (4.58d)
#5	黄诗琦	600 (10.38d)	100 (7.73h)	100 (7.82h)	100 (8.46h)	100 (4.50d)	100 (8.99h)	100 (4.50d)
#6	王彦臻	600 (10.47d)	100 (7.81h)	100 (7.86h)	100 (8.54h)	100 (4.54d)	100 (8.85h)	100 (4.55d)
#7	卢炫佑	600 (24.86d)	100 (45.18min)	100 (6.48d)	100 (6.50d)	100 (6.53d)	100 (6.56d)	100 (6.58d)
#8	韩鸿钜	580 (8.76d)	100 (7.84h)	100 (8.11h)	100 (8.77h)	100 (13.04h)	100 (14.90h)	80 (6.57d)
#9	金一航	580 (14.51d)	100 (7.76h)	100 (7.78h)	100 (8.21h)	100 (6.57d)	100 (8.86h)	80 (6.58d)
#10	刘新睿	560 (16.15d)	100 (1.27h)	100 (1.48h)	100 (1.44d)	100 (1.45d)	100 (6.57d)	60 (6.57d)
#11	张皓宁	500 (1.69d)	100 (7.52h)	100 (7.82h)	100 (7.72h)	100 (8.75h)	100 (8.77h)	
#12	赵广宇	500 (1.70d)	100 (7.61h)	100 (7.67h)	100 (8.45h)	100 (8.85h)	100 (8.10h)	
#13	许岩	500 (1.74d)	100 (7.68h)	100 (7.79h)	100 (8.31h)	100 (9.14h)	100 (8.91h)	
#14	牛晓晨	500 (6.73d)	100 (46.55min)	100 (51.90min)	100 (1.37h)	100 (1.76h)		100 (6.53d)
#15	刘智予	400 (1.35d)	100 (7.71h)	100 (7.78h)	100 (8.10h)	100 (8.83h)		
#16	陈瀚霄	400 (1.40d)	100 (7.84h)	100 (8.34h)	100 (8.29h)	100 (9.09h)		
#17	韩承煊	400 (13.26d)	100 (1.48h)	100 (1.19h)	100 (6.56d)	100 (6.60d)		
#18	范家郡	300 (4.35h)	100 (1.23h)	100 (1.20h)			100 (1.92h)	
#19	付丙霖	300 (1.00d)	100 (7.63h)	100 (7.66h)	100 (8.74h)			
#20	李政毅	300 (1.09d)	100 (8.44h)	100 (8.61h)	100 (9.09h)			

数据导出 (CSV 格式)

作业

https://www.luogu.com.cn/contest/234690 (课上讲了 A ~ D 这些题, 课后作业是 E 题)

课堂表现

今天课上讲的内容比较多, 大部分同学课上并没有全部写完这几道题的代码, 课下要再自己总结完善一下。

课堂内容

P5057 [CQOI2006] 简单题

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

using namespace std;

const int maxn = 1e5 + 5;
struct node {
  int l, r, add;
} tr[maxn*4];

void pushdown(int u) {
  if (tr[u].add) {
    tr[u*2].add ^= 1, tr[u*2+1].add ^= 1;
    tr[u].add = 0;
  }
}

void build(int u, int l, int r) {
  tr[u] = {l, r};
  if (l == r) return;
  int mid = (l + r) / 2;
  build(u*2, l, mid), build(u*2+1, mid+1, r);
}

void modify(int u, int l, int r) {
  if (tr[u].l>=l && tr[u].r<=r) { tr[u].add ^= 1; return; }

  pushdown(u);
  int mid = (tr[u].l + tr[u].r) / 2;
  if (l <= mid) modify(u*2, l, r);
  if (r > mid) modify(u*2+1, l, r);
}

int query(int u, int pos) {
  if (tr[u].l==pos && tr[u].r==pos) return tr[u].add;

  pushdown(u);
  int mid = (tr[u].l + tr[u].r) / 2;
  if (pos <= mid) return query(u*2, pos);
  return query(u*2+1, pos);
}

int main()
```

```
{
  int n, m; cin >> n >> m;
  build(1, 1, n);

  while (m -- ) {
    int op; cin >> op;
    if (op == 1) {
      int l, r; cin >> l >> r; modify(1, l, r);
    } else {
      int x; cin >> x;
      cout << query(1, x) << endl;
    }
  }
  return 0;
}
```

P3374 【模板】树状数组 1

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

using namespace std;

typedef long long LL;
const int maxn = 5e5 + 5;
int tr[maxn];

int lowbit(int x) { return x&(-x); }

void update(int x, int k) {
  while (x < maxn) {
    tr[x] += k, x += lowbit(x);
  }
}

int query(int x) {
  int res = 0;
  while (x) {
    res += tr[x], x -= lowbit(x);
  }
  return res;
}

int main()
{
  int n, m; cin >> n >> m;
  for (int i = 1; i <= n; ++i) {
    int x; cin >> x; update(i, x);
  }

  while (m -- ) {
    int op; cin >> op;
```

```
    if (op == 1) {
      int x, k; cin >> x >> k; update(x, k);
    } else {
      int l, r; cin >> l >> r;
//      cout << "---------------- ";
      cout << query(r) - query(l-1) << endl;
    }
  }
  return 0;
}
```

P3368 【模板】树状数组 2

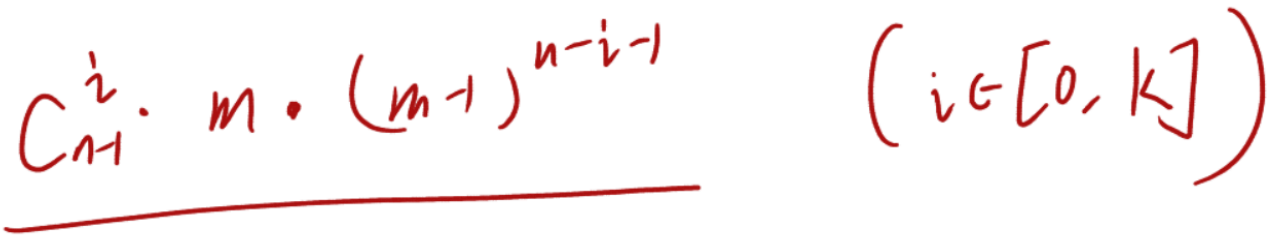
```
#include <bits/stdc++.h>

using namespace std;

typedef long long LL;
const int maxn = 5e5 + 5;
int tr[maxn];

int lowbit(int x) { return x&(-x); }

void update(int x, int k) {
  while (x < maxn) {
    tr[x] += k, x += lowbit(x);
  }
}

int query(int x) {
  int res = 0;
  while (x) {
    res += tr[x], x -= lowbit(x);
  }
  return res;
}

int main()
{
  int n, m; cin >> n >> m;
  for (int i = 1, last = 0; i <= n; ++i) {
    int x; cin >> x; update(i, x-last); last = x;
  }

  while (m -- ) {
    int op; cin >> op;
    if (op == 1) {
      int x, y, k; cin >> x >> y >> k;
      update(x, k), update(y+1, -k);
    } else {
      int x; cin >> x;
```

```
//      cout << "----------------- ";
      cout << query(x) << endl;
    }
  }
  return 0;
}
```

U221939 区间和

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

using namespace std;

typedef long long LL;
const int maxn = 3e5 + 5;
int c[maxn], x[maxn];
int l[maxn], r[maxn];
int w[maxn];
LL p[maxn];

vector<int> ys;
int fFind(int x) { return lower_bound(ys.begin(), ys.end(), x) - ys.begin() + 1; }

int main()
{
  int n, m; cin >> n >> m;
  for (int i = 1; i <= n; ++i) {
    cin >> x[i] >> c[i]; ys.push_back(x[i]);
  }
  for (int i = 1; i <= m; ++i) {
    cin >> l[i] >> r[i];
    ys.push_back(l[i]), ys.push_back(r[i]);
  }

  sort(ys.begin(), ys.end());
  ys.erase(unique(ys.begin(), ys.end()), ys.end());

  for (int i = 1; i <= n; ++i) {
    int pos = fFind(x[i]); w[pos] += c[i];
  }
  for (int i = 1; i < maxn; ++i) p[i] = p[i-1] + w[i];

  for (int i = 1; i <= m; ++i) {
    int ll = fFind(l[i]), rr = fFind(r[i]);
    cout << p[rr] - p[ll-1] << endl;
  }
  return 0;
}
```

AT_abc167_e [ABC167E] Colorful Blocks




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

using namespace std;

typedef long long LL;
const int maxn = 2e5 + 5;
const int mod = 998244353;
int fac[maxn], i_fac[maxn];

int qmod(int a, int k) {
  int res = 1;
  while (k) {
    if (k&1) res = (LL)res * a % mod;
    a = (LL)a * a % mod;
    k >>= 1;
  }
  return res;
}

void init() {
  fac[0] = i_fac[0] = 1;
  for (int i = 1; i < maxn; ++i) fac[i] = (LL)fac[i-1]*i % mod;
  for (int i = 1; i < maxn; ++i) i_fac[i] = qmod(fac[i], mod-2);
}

int C(int n, int m) {
  return (LL)fac[n] * i_fac[m] % mod * i_fac[n-m] % mod;
}

int main()
{
  init();

  int n, m, k; cin >> n >> m >> k;
  int res = 0;
  for (int i = 0; i <= k; ++i) {
    int t = (LL)C(n-1,i) * m % mod * qmod(m-1, n-i-1) % mod;
    res = (res + t) % mod;
  }
  cout << res << endl;
  return 0;
}
```