逆元

人员

赵广宇、刘智予、李政毅、张皓宁、韩鸿钜、许岩、方冠霖、金一航、曹承贤、陈瀚霄、黄诗琦、付丙霖、王彦臻 到课

上周作业检查

上周作业链接: https://www.luogu.com.cn/contest/232116

2025-0222 五队上课 (线段树)

报名 编辑比赛 题目数 5 报名人数 23

比赛说明 题目列表 排行榜

名次	参赛者	总分	A	B	C	D	E
#1	隋天翼	500 (7.40d)	100 (53.57min)	100 (1.39h)	100 (1.59h)	100 (2.58h)	100 (7.13d)
#2	方广宁	500 (9.09d)	100 (9.02h)	100 (8.64h)	100 (2.50d)	100 (1.29d)	100 (4.57d)
#3	赵广宇	500 (19.71d)	100 (9.02h)	100 (8.63h)	100 (4.48d)	100 (7.24d)	100 (7.25d)
#4	黄诗琦	450 (11.03d)	100 (7.31h)	100 (8.57h)	100 (9.02h)	100 (4.46d)	50 (5.53d)
#5	付丙霖	405 (23.36d)	100 (1.56d)	100 (9.35h)	100 (7.13d)	5 (7.16d)	100 (7.12d)
#6	金一航	400 (4.32d)	100 (1.31d)	100 (8.93h)	100 (1.31d)	100 (1.33d)	
#7	张皓宁	400 (10.18d)	100 (7.27d)	100 (8.47h)	100 (1.05d)	100 (1.50d)	
#8	范家郡	400 (24.07d)	100 (5.45d)	100 (5.49d)	100 (6.55d)	100 (6.58d)	
#9	刘智予	300 (1.28d)	100 (11.06h)	100 (8.66h)	100 (10.90h)		
#10	牛晓晨	300 (1.60d)	100 (1.66h)	100 (1.62h)	100 (1.47d)		
#11	刘锦轩	300 (4.81d)	100 (1.60d)	100 (1.60d)	100 (1.60d)		
#12	曹承贤	300 (7.87d)	100 (8.61h)	100 (8.58h)	100 (7.16d)		
#13	许岩	300 (8.25d)	100 (12.72h)	100 (7.17d)		100 (13.15h)	
#14	刘新睿	300 (9.44d)	100 (6.52d)	100 (1.45d)	100 (1.47d)		
#15	韩鸿钜	300 (9.50d)	100 (2.56d)	100 (8.44h)	100 (6.59d)		
#16	卢炫佑	300 (12.09d)	100 (35.37min)	100 (5.55d)	100 (6.51d)		
#17	李政毅	300 (21.53d)	100 (7.21d)	100 (7.13d)	100 (7.19d)		
#18	韩承煊	250 (8.59d)	100 (1.38h)	50 (7.01d)	100 (1.53d)		
#19	陈瀚霄	200 (7.50d)		100 (9.08h)	100 (7.12d)		

作业

https://www.luogu.com.cn/contest/233402 (课上讲了 A ~ E 几个题, 课后作业是 F 题)

课堂表现

同学们今天上课听讲做题都比较认真, 但是上节课作业完成情况比较差, 同学们以后一定要引起重视, 认真完成作业。

课堂内容

P3811 【模板】模意义下的乘法逆元

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

using namespace std;

typedef long long LL;
int mod;

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;
}

int inv(int x) { return qmod(x, mod-2); }

const int maxn = 3e6 + 5;
int fac[maxn], i_fac[maxn];

int main()
{
  int n; cin >> n >> mod;

  fac[0] = 1;
  for (int i = 1; i <= n; ++i) fac[i] = (LL)fac[i-1]*i % mod;

  i_fac[n] = inv(fac[n]);
  for (int i = n-1; i >= 0; --i) i_fac[i] = (LL)i_fac[i+1]*(i+1) % mod;

  for (int i = 1; i <= n; ++i) {
    cout << (LL)i_fac[i]*fac[i-1] % mod << "\n";
  }
  return 0;
}
```

P5732 【深基5.习7】杨辉三角

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

using namespace std;

const int maxn = 20 + 5;
int w[maxn][maxn];

int main()
{
  int n; cin >> n;
  for (int i = 0; i <= n-1; ++i) {
    w[i][0] = 1;
    cout << w[i][0];
    for (int j = 1; j <= i; ++j) {
      w[i][j] = w[i-1][j-1] + w[i-1][j];
      cout << " " << w[i][j];
    }
    cout << endl;
  }
  return 0;
}
```

B3717 组合数问题

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

using namespace std;

typedef long long LL;
const int mod = 998244353;

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;
}

int inv(int x) { return qmod(x, mod-2); }

const int maxn = 5e6 + 5;
int fac[maxn], inv_fac[maxn];

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

```
int main()
{
  ios::sync_with_stdio(false); cin.tie(0);

  int T, c; cin >> T >> c;
  fac[0] = 1; for (int i = 1; i <= c; ++i) fac[i] = (LL)fac[i-1]*i % mod;
  inv_fac[c] = inv(fac[c]); for (int i = c-1; i >= 0; --i) inv_fac[i] =
(LL)inv_fac[i+1]*(i+1) % mod;

  int res = 0;
  while (T -- ) {
    int n, m; cin >> n >> m; res ^= C(n, m);
  }
  cout << res << endl;
  return 0;
}
```

P5431 【模板】模意义下的乘法逆元 2

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

using namespace std;

typedef long long LL;
int mod;

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;
}

int inv(int x) { return qmod(x, mod-2); }

const int maxn = 5e6 + 5;
int w[maxn], s[maxn], suf_s[maxn];

int read() {
  char ch = getchar();
  int res = 0, f = 1;
  while (!isdigit(ch)) {
    if (ch == '-') f = -1;
    ch = getchar();
  }
  while (isdigit(ch)) res = res*10 + (ch-'0'), ch = getchar();
  return res*f;
}
```

```
int main()
{
  int n, k; cin >> n >> mod >> k;

  s[0] = 1; for (int i = 1; i <= n; ++i) w[i] = read(), s[i] = (LL)s[i-1]*w[i] %
mod;
  suf_s[n] = inv(s[n]); for (int i = n-1; i >= 0; --i) suf_s[i] =
(LL)suf_s[i+1]*w[i+1] % mod;

  int res = 0, t = 1;
  for (int i = 1; i <= n; ++i) {
    t = (LL)t * k % mod;
    int value = (LL)t * suf_s[i] % mod * s[i-1] % mod;
    res = (res + value) % mod;
  }
  cout << res << endl;
  return 0;
}
```

P3372 【模板】线段树 1

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

using namespace std;

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

void build(int u, int l, int r) {
  tr[u] = {l, r, 0, 0};
  if (l == r) { tr[u].sum = w[l]; return; }

  int mid = (l + r) / 2;
  build(u*2, l, mid), build(u*2+1, mid+1, r);
  tr[u].sum = tr[u*2].sum + tr[u*2+1].sum;
}

LL modify(int u, int l, int r, LL k) {
  if (tr[u].l>=l && tr[u].r<=r) {
    LL t = k*(tr[u].r-tr[u].l+1);
    tr[u].add += k, tr[u].sum += t; return t;
  }

  int mid = (tr[u].l + tr[u].r) / 2;
```

```
  LL value = 0;
  if (l <= mid) value += modify(u*2, l, r, k);
  if (r > mid) value += modify(u*2+1, l, r, k);
  tr[u].sum += value;
  return value;
}

int calc(int l1, int r1, int l2, int r2) {
    if (min(r1,r2) - max(l1,l2) + 1 <= 0) return 0;
    return min(r1,r2) - max(l1,l2) + 1;
}

LL query(int u, int l, int r) {
  if (tr[u].l>=l && tr[u].r<=r) return tr[u].sum;

  LL value = (LL)calc(l,r,tr[u].l,tr[u].r)*tr[u].add;
  int mid = (tr[u].l + tr[u].r) / 2;
  LL res = 0;
  if (l <= mid) res += query(u*2, l, r);
  if (r > mid) res += query(u*2+1, l, r);
  return res + value;
}

int main()
{
  int n, m; cin >> n >> m;
  for (int i = 1; i <= n; ++i) cin >> w[i];
  build(1, 1, n);

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