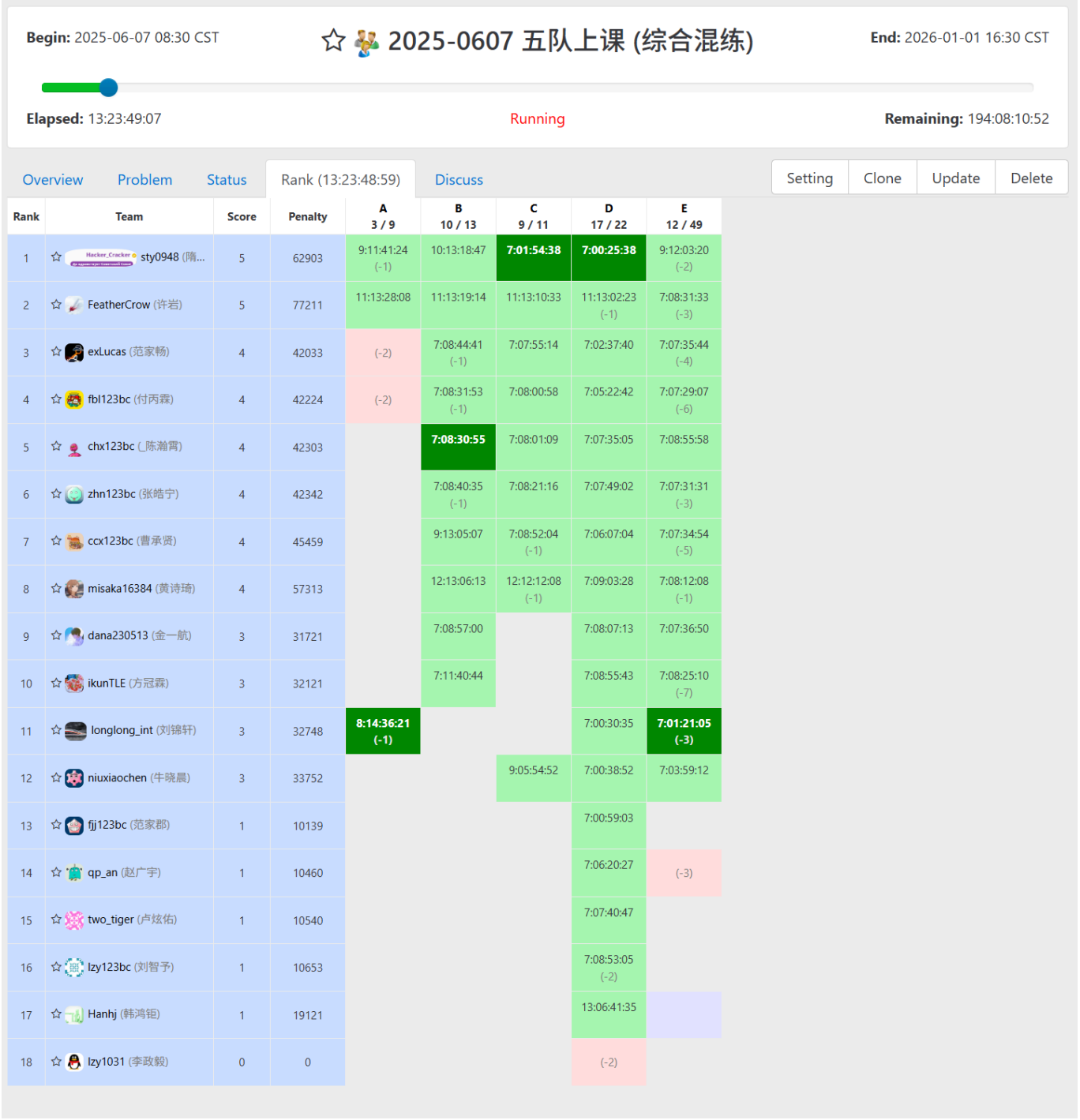
综合混练

人员

牛晓晨、刘新睿、隋天翼 到课

上周作业检查

上上周作业链接: https://vjudge.net/contest/721752



Begin: 2025-06-07 08:30 CST ☆ 2025-0607 五队上课 (综合混练) **End:** 2026-01-01 16:30 CST

Elapsed: 13:23:49:07 Running **Remaining:** 194:08:10:52

Overview | Problem | Status | Rank (13:23:48:59) | Discuss | Setting | Clone | Update | Delete

Rank	Team	Score	Penalty	A 3 / 9	B 10 / 13	C 9 / 11	D 17 / 22	E 12 / 49
1	☆ sty0948 (隋...	5	62903	9:11:41:24 (-1)	10:13:18:47	**7:01:54:38**	**7:00:25:38**	9:12:03:20 (-2)
2	☆ FeatherCrow (许岩)	5	77211	11:13:28:08	11:13:19:14	11:13:10:33	11:13:02:23 (-1)	7:08:31:33 (-3)
3	☆ exLucas (范家畅)	4	42033	(-2)	7:08:44:41 (-1)	7:07:55:14	7:02:37:40	7:07:35:44 (-4)
4	☆ fbl123bc (付丙霖)	4	42224	(-2)	7:08:31:53 (-1)	7:08:00:58	7:05:22:42	7:07:29:07 (-6)
5	☆ chx123bc (_陈瀚胃)	4	42303		**7:08:30:55**	7:08:01:09	7:07:35:05	7:08:55:58
6	☆ zhn123bc (张皓宁)	4	42342		7:08:40:35 (-1)	7:08:21:16	7:07:49:02	7:07:31:31 (-3)
7	☆ ccx123bc (曹承贤)	4	45459		9:13:05:07	7:08:52:04 (-1)	7:06:07:04	7:07:34:54 (-5)
8	☆ misaka16384 (黄诗琦)	4	57313		12:13:06:13	12:12:12:08 (-1)	7:09:03:28	7:08:12:08 (-1)
9	☆ dana230513 (金一航)	3	31721		7:08:57:00		7:08:07:13	7:07:36:50
10	☆ ikunTLE (方冠霖)	3	32121		7:11:40:44		7:08:55:43	7:08:25:10 (-7)
11	☆ longlong_int (刘锦轩)	3	32748	**8:14:36:21 (-1)**			7:00:30:35	**7:01:21:05 (-3)**
12	☆ niuxiaochen (牛晓晨)	3	33752			9:05:54:52	7:00:38:52	7:03:59:12
13	☆ fjj123bc (范家郡)	1	10139				7:00:59:03	
14	☆ qp_an (赵广宇)	1	10460				7:06:20:27	(-3)
15	☆ two_tiger (卢炫佑)	1	10540				7:07:40:47	
16	☆ lzy123bc (刘智予)	1	10653				7:08:53:05 (-2)	
17	☆ Hanhj (韩鸿钜)	1	19121				13:06:41:35	
18	☆ lzy1031 (李政毅)	0	0				(-2)	

上周作业链接: https://vjudge.net/contest/722784

作业

https://vjudge.net/contest/724229 (课上讲了上周比赛的 A B C D E, 课后作业是本周比赛的 A B C D E 题)

课堂表现

今天的 A C 两道题实现比较复杂一些, 同学们课下要静下心来沉住气慢慢写一写

E 题比较新颖, 题目本身不是很难, 同学们可以好好研究研究这个题

课堂内容

P1438 无聊的数列

```cpp
// 方法一，用差分做
#include <bits/stdc++.h>

using namespace std;

typedef long long LL;
const int maxn = 1e6 + 5;
struct node {
  int l, r;
  LL add, sum;
} tr[maxn*4];
int w[maxn];

void pushup(int u) { tr[u].sum = tr[u*2].sum + tr[u*2+1].sum; }

void pushdown(int u) {
  if (tr[u].add != 0) {
    node &uu = tr[u], &ll = tr[u*2], &rr = tr[u*2+1];
    ll.add += uu.add, ll.sum += uu.add * (ll.r-ll.l+1);
    rr.add += uu.add, rr.sum += uu.add * (rr.r-rr.l+1);
    uu.add = 0;
  }
}

void build(int u, int l, int r) {
  tr[u] = {l, r, 0, 0};
  if (l == r) { tr[u].sum = w[l] - w[l-1]; return; }
  int mid = (l + r) / 2;
  build(u*2, l, mid), build(u*2+1, mid+1, r);
  pushup(u);
}

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

  pushdown(u);
```

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

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

  pushdown(u);
  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;
}

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, k, d; cin >> l >> r >> k >> d;
      // l: +k, l+1~r: +d, r+1: k+(r-l)*d
      modify(1, l, l, k), modify(1, l+1, r, d);
      if (r+1 <= n) modify(1, r+1, r+1, -(k+(r-l)*d));
    } else {
      int pos; cin >> pos;
//      cout << "------------------------ ";
      cout << query(1, 1, pos) << endl;
    }
  }
  return 0;
}
```

```
// 方法二，维护 首项 和 公差 2 个懒标记
#include <bits/stdc++.h>

using namespace std;

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

```
void pushdown(int u) {
  if (tr[u].flag) {
    node &uu = tr[u], &ll = tr[u*2], &rr = tr[u*2+1];
    ll.flag = rr.flag = true;
    ll.k += uu.k, rr.k += uu.k + uu.d*(ll.r-ll.l+1);
    ll.d += uu.d, rr.d += uu.d;
    uu.flag = false; uu.k = uu.d = 0;
  }
}

void build(int u, int l, int r) {
  tr[u] = {l, r, 0, 0, 0, false};
  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);
}

void modify(int u, int l, int r, int k, int d) {
  if (tr[u].l>=l && tr[u].r<=r) {
    tr[u].flag = true;
    tr[u].k += k + (tr[u].l-l)*d, tr[u].d += d;
    return;
  }

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

LL query(int u, int pos) {
  if (tr[u].l == tr[u].r) return tr[u].sum + tr[u].k;
  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;
  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, k, d; cin >> l >> r >> k >> d;
      modify(1, l, r, k, d);
    } else {
      int pos; cin >> pos;
//      cout << "--------------------- ";
      cout << query(1, pos) << endl;
```

```
    }
  }
  return 0;
}
```

CF9D How many trees?

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

using namespace std;

typedef long long LL;
const int maxn = 35 + 5;
LL f[maxn][maxn];  // f[i][j]: i个点，最高高度<=j 的有多少方案

int main()
{
  int n, h; cin >> n >> h;
  for (int i = 0; i <= n; ++i) f[0][i] = 1;

  for (int i = 1; i <= n; ++i) {
    for (int j = 1; j <= n; ++j) {
      // i 个点，最高高度 <=j
      for (int k1 = 0; k1 <= i-1; ++k1) {
        int k2 = i - 1 - k1;
        f[i][j] += f[k1][j-1]*f[k2][j-1];
      }
    }
  }


  cout << f[n][n] - f[n][h-1] << endl;
  return 0;
}
```

CF1016C Vasya And The Mushrooms

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

using namespace std;

typedef long long LL;
const int maxn = 3e5 + 5;
int w[3][maxn];
LL pV[3][maxn], sV[3][maxn], p[3][maxn];

int n;
```

```
LL get_sum(int row, int l, int r, LL c[][maxn], bool is_pre) {
    if (l > r) return 0;
    if (is_pre) return c[row][r] - c[row][l-1];
    return c[row][l] - c[row][r+1];
}

LL preValue(int x, int y, int day) {
    return get_sum(x,y,n,pV,true) + (day-y)*get_sum(x,y,n,p,true);
}

LL sufValue(int x, int y, int day) {
    return get_sum(x,y,n,sV,false) + (day-1)*get_sum(x,y,n,p,true);
}

LL calc(int x, int y, int day) {
    if (x==1) {
        if (y&1) {  // (1,y,n)  (2,y,n)
            return preValue(1,y,day) + sufValue(2,y,day+n-y+1);
        } else { // (1,y,n) (2,y+1,n)
            return preValue(1,y,day) + sufValue(2,y+1,day+n-y+1);
        }
    } else {
        if (y&1) {  // (2,y,n) (1,y+1,n)
            return preValue(2,y,day) + sufValue(1,y+1,day+n-y+1);
        } else {  // (2,y,n) (1,y,n)
            return preValue(2,y,day) + sufValue(1,y,day+n-y+1);
        }
    }
}

int main()
{
    cin >> n;
    for (int i = 1; i <= 2; ++i) {
        for (int j = 1; j <= n; ++j) {
            cin >> w[i][j];
            p[i][j] = p[i][j-1] + w[i][j];
            pV[i][j] = pV[i][j-1] + 1LL*w[i][j]*j;
        }
    }
    for (int i = 1; i <= 2; ++i) {
        for (int j = n; j >= 1; --j) {
            sV[i][j] = sV[i][j+1] + 1LL*w[i][j]*(n-j+1);
        }
    }

    LL res = 0, sum = 0;
    int day = 0;
    for (int j = 1; j <= n; j++) {
        if (j&1) {
            for (int i = 1; i <= 2; ++i) {
                res = max(res, sum+calc(i,j,day));
                sum += 1LL*w[i][j]*day; ++day;
            }
```

```
        } else {
            for (int i = 2; i >= 1; --i) {
                res = max(res, sum+calc(i,j,day));
                sum += 1LL*w[i][j]*day; ++day;
            }
        }
    }
    cout << res << endl;
    return 0;
}
```

CF1914F Programming Competition

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

using namespace std;

const int maxn = 2e5 + 5;
vector<int> vec[maxn];
int f[maxn], sz[maxn];
int n;

void dfs(int u) {
  int maxx_sz = 0, maxx_f = 0;
  for (int i : vec[u]) {
    dfs(i); sz[u] += sz[i];
    if (sz[i] > maxx_sz) {
      maxx_sz = sz[i], maxx_f = f[i];
    } else if (sz[i] == maxx_sz) maxx_f = f[i];
  }

  if (maxx_sz*2 <= sz[u]) f[u] = sz[u]/2;
  else {
    int now = maxx_f*2;
    int last_sz = maxx_sz - now;
    if (last_sz*2 <= sz[u]-now) f[u] = sz[u]/2;
    else f[u] = maxx_f + (sz[u]-maxx_sz);
  }

  sz[u]++;
}

void solve() {
  cin >> n; for (int i = 1; i <= n; ++i) vec[i].clear(), f[i] = sz[i] = 0;
  for (int i = 2; i <= n; ++i) {
    int x; cin >> x; vec[x].push_back(i);
  }

  dfs(1);
//  cout << "---------------------- ";
  cout << f[1] << endl;
```

```
}

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

POJ 2566 Bound Found

```
#include <iostream>
#include <algorithm>

using namespace std;

const int maxn = 1e5 + 5;
struct node {
  int value, id;
  bool operator < (const node& p) const { return value < p.value; }
} w[maxn];
int p[maxn];

void solve(int n, int x) {
  int res = 2e9+100, resl = 1, resr = 1;
  for (int i = 0; i <= n-1; ++i) {
    node temp = {w[i].value+x, 0};
    int j2 = lower_bound(w+i+1, w+n+1, temp) - w;
    int j1 = j2 - 1;
    if (j1>i && abs(w[j1].value-w[i].value-x)<abs(res-x)) {
      res = w[j1].value-w[i].value, resl = w[i].id, resr = w[j1].id;
    }
    if (j2<=n && abs(w[j2].value-w[i].value-x)<abs(res-x)) {
      res = w[j2].value-w[i].value, resl = w[i].id, resr = w[j2].id;
    }
  }

//  cout << "----------------------------- ";
  cout << res << " " << min(resl,resr)+1 << " " << max(resl,resr) << endl;
}

int main()
{
  while (true) {
    int n, T; cin >> n >> T;
    if (!n && !T) break;

    for (int i = 1; i <= n; ++i) {
      int x; cin >> x, p[i] = p[i-1] + x;
    }
```

```
    for (int i = 0; i <= n; ++i) w[i] = {p[i], i};
    sort(w, w+n+1);

    while (T -- ) {
      int x; cin >> x; solve(n, x);
    }
  }
  return 0;
}
```