

# 综合混练

## 人员

赵广宇、金一航、曹承贤、张皓宁、陈瀚霄、许岩、韩鸿钜、方冠霖、黄诗琦、卢炫佑、付丙霖、范家畅、刘锦轩、刘智予 到课, 李政毅 线上

## 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: 14:09:11:15

Running

Remaining: 193:22:48:44

Overview

Problem

Status

Rank (14:09:11:10)

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	☆👤 Hacker_Cracker 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 (陈瀚霄)	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	☆👤 fj123bc (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

```
// 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;
}
```