

# 杂题混练

## 人员

李佳声、窦浩轩、穆鹏宇、梁钰涵、胡赫轩、崔嘉睿、周子航、程晟泰、蔡云翔、石宇焮 到课

## 上周作业检查

Begin: 2024-12-07 08:43 CST

☆👤 2024-1207 ~ 1208 三队上课

End: 2025-02-28 16:43 CST

Elapsed: 6:23:38:39

Running

Remaining: 76:08:21:20

OverviewProblemStatusRank (6:23:38:38)DiscussSettingCloneUpdateDelete

Rank	Team	Score	Penalty	A 11 / 23	B 6 / 20	C 2 / 2	D 4 / 4	E 6 / 11	F 0 / 0
1	☆🇩🇪 ssine233 (穆鹏宇)	5	10623	0:05:12	1:09:17 (-2)	8:45:44	13:06:57	6:09:16:27	
2	☆🤖 syzliangyuhan (梁钰...	5	37931	0:05:03	6:15:07:50 (-3)	6:13:04:52	6:13:14:45	6:13:38:42	
3	☆🌈 Cst_AK_IOI (程晟泰)	4	19060	0:29:27 (-4)	1:45:13 (-3)		6:12:41:32	6:11:43:54 (-2)	
4	☆🇺🇸 zhouzihang1 (周子航)	3	9626	0:21:17 (-1)	1:38:04 (-4)			6:12:46:57	
5	☆🇨🇳 Cui2011 (崔嘉睿)	3	9637	0:26:41	1:30:13 (-1)			6:13:20:41 (-3)	
6	☆🇩🇪 huhexuan (胡赫轩)	3	18589	0:11:26			6:10:40:24	6:10:57:19	
7	☆🤖 yujiahaoa (Pswd com...	2	3621	1:05:16:18	1:06:45:39 (-1)				
8	☆👤 caiyunxiang (蔡云翔)	1	36	0:36:24					
9	☆👤 lijiaosheng (李佳声)	1	90	0:30:50 (-3)					
10	☆🇨🇳 douhaoxuan (窦浩轩)	1	98	0:38:31 (-3)					
11	☆👤 zuoziyi	1	1784	1:05:24:22 (-1)					

## 作业

<https://vjudge.net/contest/679674>

## 课堂表现

同学们课下要先补完这周的 4 道题目, 然后再思考完成下周的 5 道题。

## 课堂内容

CF1458B Glass Half Spilled

```

#include <bits/stdc++.h>

using namespace std;

const int inf = 0x3f3f3f3f;
const int N = 100 + 5;
const int M = N * N;
int a[N], b[N];
int f[N][M];

int main()
{
    int n; cin >> n;
    int sum = 0;
    for (int i = 1; i <= n; ++i) {
        cin >> a[i] >> b[i];
        sum += b[i];
    }

    for (int i = 0; i < N; ++i) {
        for (int j = 0; j < M; ++j) f[i][j] = -inf;
    }
    f[0][0] = 0;
    for (int i = 1; i <= n; ++i) {
        for (int j = i; j >= 1; --j) {
            for (int k = M - 1; k >= a[i]; --k) {
                f[j][k] = max(f[j][k], f[j - 1][k - a[i]] + b[i]);
            }
        }
    }

    for (int i = 1; i <= n; ++i) {
        double res = 0;
        for (int j = 0; j < M; ++j) {
            if (f[i][j] <= -inf / 2) continue;
            double t = min((double)j, (sum + f[i][j]) / 2.0);
            res = max(res, t);
        }
        printf("%.10f ", res);
    }
    return 0;
}

```

## CF540D Bad Luck Island

```

#include <bits/stdc++.h>

using namespace std;

const int maxn = 100 + 5;

```

```

double f[maxn][maxn][maxn];

int main()
{
    int r, s, p; cin >> r >> s >> p;
    double res1 = 0, res2 = 0, res3 = 0;
    f[r][s][p] = 1;
    for (int i = r; i >= 0; --i) {
        for (int j = s; j >= 0; --j) {
            for (int k = p; k >= 0; --k) {
                int t = i*j + j*k + i*k;
                if (i&&j) f[i][j-1][k] += f[i][j][k] * 1.0*(i*j)/t;
                if (j&&k) f[i][j][k-1] += f[i][j][k] * 1.0*(j*k)/t;
                if (i&&k) f[i-1][j][k] += f[i][j][k] * 1.0*(i*k)/t;

                if (!j&&!k) res1 += f[i][j][k];
                if (!i&&!k) res2 += f[i][j][k];
                if (!i&&!j) res3 += f[i][j][k];
            }
        }
    }

    printf("%.9f %.9f %.9f\n", res1, res2, res3);
    return 0;
}

```

### CF463D Gargari and Permutations

```

#include <iostream>
#include <vector>
#include <queue>

using namespace std;

const int maxn = 1000 + 5;
int w[6][maxn];
vector<int> vec[maxn];
int ig[maxn];

int f[maxn];

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

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

```

```

    for (int j = 1; j <= n; ++j) {
        if (i == j) continue;
        bool flag = true;
        for (int k = 1; k <= m; ++k) {
            int p1 = w[k][i], p2 = w[k][j];
            if (p1 > p2) flag = false;
        }
        if (flag) {
            vec[i].push_back(j), ++ig[j];
        }
    }
}

queue<int> q;
for (int i = 1; i <= n; ++i) {
    if (!ig[i]) f[i] = 1, q.push(i);
}

while (!q.empty()) {
    int u = q.front(); q.pop();
    for (int i : vec[u]) {
        if (f[i] < f[u]+1) {
            f[i] = f[u]+1, q.push(i);
        }
    }
}

int res = 0;
for (int i = 1; i <= n; ++i) res = max(res, f[i]);
cout << res << 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]: 一共 i 个点, 高度 <= j 时有多少方案

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 <= h; ++j) {
            for (int k = 0; k <= i-1; ++k) {

```

```
        // left: k, right: i-1-k
        f[i][j] += f[k][j-1] * f[i-1-k][j-1];
    }
}
}

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

## CF577B Modulo Sum

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

using namespace std;

const int maxn = 1000 + 5;
int w[maxn*maxn];
bool p[maxn], h[maxn];

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

    if (n >= m) { cout << "YES" << endl; return 0; }

    for (int i = 1; i <= n; ++i) {
        h[w[i]] = true;
        for (int j = 0; j < m; ++j) {
            if (p[j]) h[(j+w[i])%m] = true;
        }
        memcpy(p, h, sizeof(p));
    }

    cout << (h[0] ? "YES" : "NO") << endl;
    return 0;
}
```