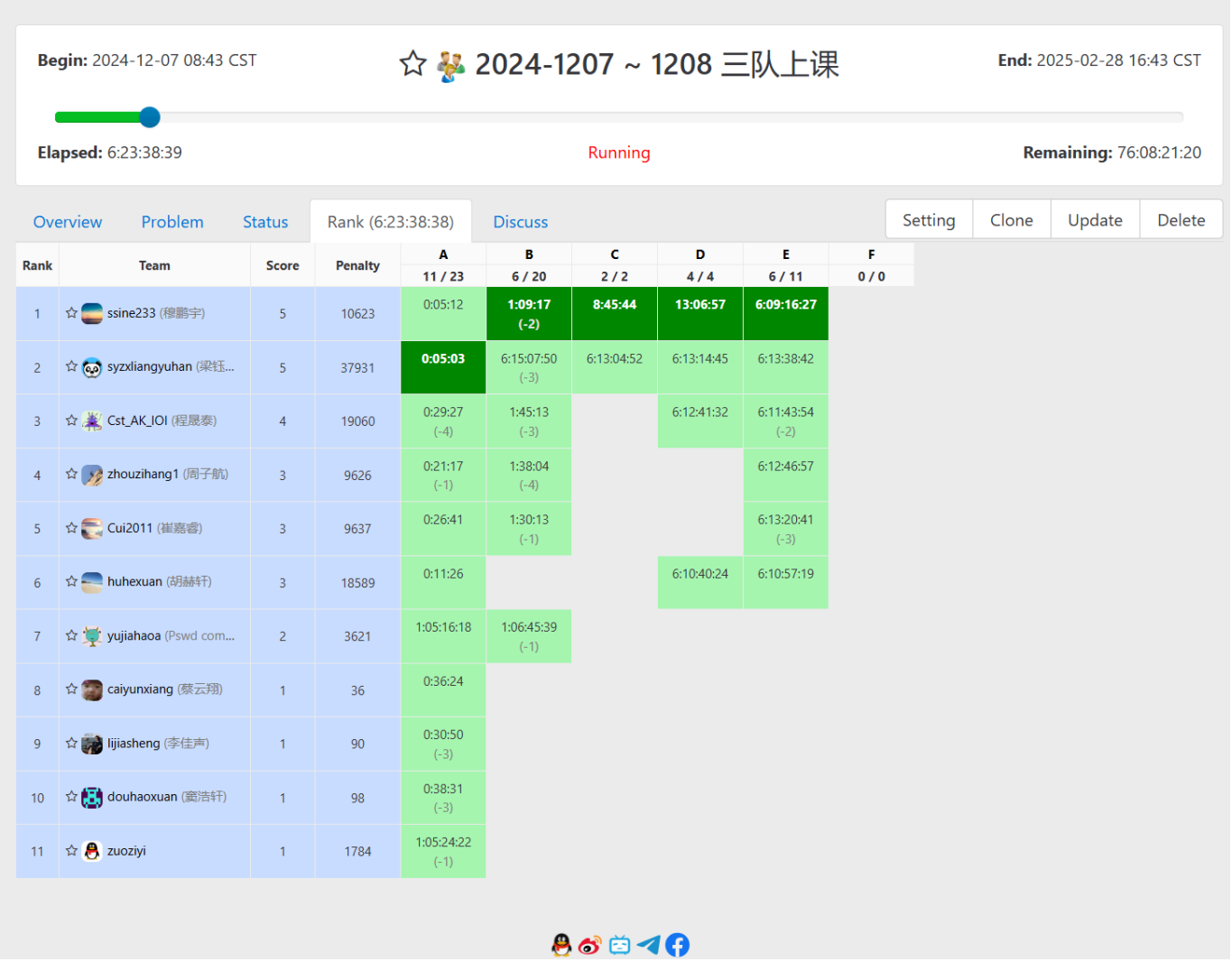
杂题混练

人员

左子毅、杨洋、于珈浩、朱奕鸣 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

Overview Problem Status Rank (6:23:38:38) Discuss Setting Clone Update Delete

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	☆ syzxliangyuhan (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	☆ lijiasheng (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

```cpp
#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

```cpp
#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 <= n; ++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;
}
```