Олимпиада СПбГУ
по информатике
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A	B	C	D	E	F	sum
100	100	40	100	20	47	407

Task A

```
#define _USE_MATH_DEFINES

#include <iostream>
#include <vector>
#include <queue>
#include <stack>
#include <deque>
#include <map>
#include <set>
#include <cmath>
#include <random>
#include <iterator>
#include <algorithm>

using namespace std;

int main()
{
    int a, b, n, c = 0;
    cin >> a >> b >> n;
    if (b < a){
        int tmp;
        tmp = a;
        a = b;
        b = tmp;
    }
    vector<long long> dp(n, (long long)0);
    dp[0] = 1;
    for (int i = 1; i < n; ++i){
```

```
        if (a > n){
            dp[0] = 0;
        } else if (b > n){
            dp[i] = dp[(n + i - a) % n];
        } else{
            dp[i] = dp[(n + i - a) % n] + dp[(n + i - b) % n];
        }
    }
    if (a > n){
        cout << 0 << endl;
    } else if (b > n){
        cout << dp[n - a] * a << endl;
    } else{
        cout << dp[n - a] * a + dp[n - b] * b << endl;
    }
    return 0;
}
```

Task B

```
#define _USE_MATH_DEFINES

#include <iostream>
#include <vector>
#include <queue>
#include <stack>
#include <deque>
#include <map>
#include <set>
#include <cmath>
#include <random>
#include <iterator>
#include <algorithm>

using namespace std;

int main()
{
    long long n, x0, y0, z0, x1, y1, z1, x2, y2, z2, d, dmin;
    cin >> n >> x1 >> y1 >> z1 >> x2 >> y2 >> z2;
    d = max(abs(x1 - x2), max(abs(y1 - y2), abs(z1 - z2)));
    dmin = d;
    for (int i = 0; i < 6; ++i){
        if (i < 2){
            x0 = 2 * n;
            y0 = -n;
            z0 = -n;
        } else if (i < 4){
            x0 = -n;
            y0 = 2 * n;
            z0 = -n;
        } else{
            x0 = -n;
```

```
            y0 = -n;
            z0 = 2 * n;
        }
        if (i % 2 == 1){
            x0 *= -1;
            y0 *= -1;
            z0 *= -1;
        }
        x0 += x2;
        y0 += y2;
        z0 += z2;
        d = max(abs(x0 - x1), max(abs(y0 - y1), abs(z0 - z1)));
        dmin = min(d, dmin);
    }
    cout << dmin;
    return 0;
}
```

Task C

```
#define _USE_MATH_DEFINES

#include <iostream>
#include <vector>
#include <queue>
#include <stack>
#include <deque>
#include <map>
#include <set>
#include <cmath>
#include <random>
#include <iterator>
#include <algorithm>

using namespace std;

int main()
{
    int n;
    string test;
    cin >> test;
    cin >> n;
    if (test == "first"){
        string s;
        cin >> s;
        int c = 0;
        for (int i = 0; i < n; ++i){
            if (s[i] == '1'){
                c++;
            }
        }
        cout << c << " ";
        int x = to_string(c).size();
```

```
        for (int i = 0; i < min(n, 100 - x - 1); ++i){
            cout << s[i];
        }
    } else{
        string t, h;
        int m, c = 0;
        cin >> t >> m >> h;
        for (int i = 0; i < n; ++i){
            if (t[i] == '1'){
                c++;
            }
        }
        if (m == c && n <= 100){
            bool good;
        for (int i = 0; i < n; ++i){
            good = true;
            for (int j = 0; j < h.size(); ++j){
                if (t[(i + j) % n] != h[j]){
                    good = false;
                    break;
                }
            }
            if (good){
                cout << "YES" << endl;
                break;
            }
        }
        if (!good){
            cout << "NO" << endl;
        }
        } else{
            cout << "NO" << endl;
        }

    }
    return 0;
}
```

Task D

```
#define _USE_MATH_DEFINES

#include <iostream>
#include <vector>
#include <queue>
#include <stack>
#include <deque>
#include <map>
#include <set>
#include <cmath>
#include <random>
#include <iterator>
#include <algorithm>
```

```
using namespace std;

int main()
{
    int n;
    string inp;
    cin >> n;
    cout << "1 1" << endl;
    int c = 1;
    cin >> inp;
    while (inp != "!"){
        if (c % n == 0){
            cout << "1 1" << endl;
        } else{
            if (inp == ">"){
                cout << "1 " << n << endl;
            } else{
                cout << "1 1" << endl;
            }
        }
        c++;
        cin >> inp;
    }
    return 0;
}
```

Task E

```
#define _USE_MATH_DEFINES

#include <iostream>
#include <vector>
#include <queue>
#include <stack>
#include <deque>
#include <map>
#include <set>
#include <cmath>
#include <random>
#include <iterator>
#include <algorithm>

using namespace std;

int n, q, c = 0, it = 0;
vector<vector<int>> G;
vector<int> k(n, 0);
vector<int> order;

void dfs(int v){
    order.push_back(v);
    it++;
```

```
    int u = G[v][k[v] % G[v].size()];
    //cout << "before: v:" << v << " u:" << u << " k[v]:" << k[v] << " G[
   v].size():" << G[v].size() << " c:" << c << endl;
    k[v]++;
    if (G[v].size() != 1){
        if (k[v] % G[v].size() == 0){
            c++;
        }
        if ((k[v] - 1) % G[v].size() == 0){
            c--;
        }
    }
    //cout << "after: v:" << v << " u:" << u << " k[v]:" << k[v] << " G[v
   ].size():" << G[v].size() << " c:" << c << endl;
    if (u == 0){
        //for (int i = 0; i < n; ++i){
            //cout << i + 1 << ": " << k[i] << " " << G[i].size() << " "
   << k[i] % G[i].size() << endl;
        //}
        //cout << "!" << endl;
    }
    if (c == n && u == 0){
        //cout << "out" << endl;
        return;
    } else{
        if (it > 100000){
            return;
        }
        dfs(u);
    }
}

int main()
{
    cin >> n >> q;
    c = n;
    k.assign(n, 0);
    for (int i = 0; i < n; ++i){
        int d;
        cin >> d;
        vector<int> tmp(d);
        for (int j = 0; j < d; ++j){
            cin >> tmp[j];
            tmp[j]--;
        }
        G.push_back(tmp);
    }
    //cout << endl;
    dfs(0);
    long long t;
    for (int i = 0; i < q; ++i){
        cin >> t;
        cout << order[t % order.size()] + 1 << " ";
```

```
    }
    cout << endl;
    return 0;
}
```

Task F

```
#define _USE_MATH_DEFINES

#include <iostream>
#include <vector>
#include <queue>
#include <stack>
#include <deque>
#include <map>
#include <set>
#include <cmath>
#include <random>
#include <iterator>
#include <algorithm>

using namespace std;

int main()
{
    int h, w;
    long long e = 0;
    cin >> h >> w;
    string s;
    vector<vector<int>> a(h, vector<int>(w, 0));
    for (int i = 0; i < h; ++i){
        cin >> s;
        for (int j = 0; j < w; ++j){
            a[i][j] = s[j] - '0';
        }
    }
    vector<vector<char>> chr(h, vector<char>(w, '.'));
    for (int i = 0; i < h; ++i){
        for (int j = 0; j < w; ++j){
        if (i == h - 1 && j == w - 1 && i % 2 == 0 && j % 2 == 0){
            chr[i][j] = '.';
        } else if (j == w - 1 && j % 2 == 0){
            if (i % 2 == 0){
                chr[i][j] = 'T';
            } else{
                chr[i][j] = 'B';
                e += a[i][j] * a[i - 1][j];
            }
        } else{
            if (j % 2 == 0){
                chr[i][j] = 'L';
            } else{
                chr[i][j] = 'R';
```

```
                e += a[i][j] * a[i][j - 1];
            }
        }
        }
    }
    cout << e << endl;
    for (int i = 0; i < h; ++i){
        for (int j = 0; j < w; ++j){
            cout << chr[i][j];
        }
        cout << endl;
    }
    return 0;
}
```