Олимпиада СПбГУ
по информатике
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A	B	C	D	E	F	sum
100	.	100	75	.	90	365

Task A

```
#include <cmath>
#include <iomanip>
#include <iostream>
#include <cmath>
#include <algorithm>
#include <queue>
#include <set>
#include <string>
#include <vector>
#include <deque>
using namespace std;

using ll = long long;

void solve() {
    ll a, b, n;
    cin >> a >> b >> n;
    vector<vector<ll>> dp(n + 1, vector<ll>(n + 2));
    dp[0][1] = 1;
    for (int i = 1; i <= n; i++) {
        for (int j = 1; j <= n + 1; j++) {
            if (i >= a) {
                dp[i][j] += dp[i - a][j - 1];
                if (i >= b) {
                    dp[i][j] += dp[i - b][j - 1];
                }
            }
        }
```

```
    }
    ll ans = 0;
    for (int j = 2; j <= n + 1; j++) {
        ans += (dp[n][j] * n) / (j - 1);
    }
    cout << ans;
}

int main() {
    solve();
}
```

Task C

```
#include <cmath>
#include <iomanip>
#include <iostream>
#include <cmath>
#include <algorithm>
#include <queue>
#include <set>
#include <string>
#include <vector>
using namespace std;

using ll = long long;


ll mod = 1e9 + 7;
ll k = 37;
vector<ll> p(1e6);
void f() {
    p[0] = 1;
    p[1] = k;
    for (int i = 2; i < 1e6; i++) {
        p[i] = (p[i - 1] * k) % mod;
    }
}
ll hss(string s) {
    ll h = 0;
    for (int i = 0; i < s.size(); i++) {
        if (s[i] == '0') {
            h += 57 * (p[i]) % mod;
            h %= mod;
        }
        else {
            h += 179 * p[i] % mod;
            h %= mod;
        }
    }
    return h;
}
```

```
//522534348
int main() {
    f();
    string c;
    cin >> c;
    ll n;
    cin >> n;
    string s;
    cin >> s;
    if (c == "first") {
        cout << hss(s);
    }
    else {
        ll h;
        cin >> h;
        s = s + s;

        vector<ll> hse(s.size() + 1);
        for (int i = 1; i <= s.size(); i++) {
            if (s[i - 1] == '0') {
                hse[i] += 57 * (p[i - 1]) % mod;
                hse[i] %= mod;
                hse[i] += hse[i - 1];
                hse[i] %= mod;
            }
            else {
                hse[i] += 179 * (p[i - 1]) % mod;
                hse[i] %= mod;
                hse[i] += hse[i - 1];
                hse[i] %= mod;
            }
        }
        for (int i = 1; i <= n; i++) {
            if (i == 2) {
                h += 0;
            }
            if ((hse[i + n - 1] - hse[i - 1] + mod) % mod  == h * p[i -
    1] % mod) {
                cout << "YES";
                return 0;
            }
        }
        cout << "NO";
    }
}
```

Task D

```
#include <cmath>
#include <iomanip>
#include <iostream>
#include <cmath>
#include <algorithm>
```

```
#include <queue>
#include <set>
#include <string>
#include <vector>
#include <deque>
using namespace std;

using ll = long long;
vector<vector<ll>> g;
vector<ll> t;
vector<ll> used;
ll n;
void dfs(ll  v) {
    used[v] = 1;
    for (auto elem : g[v]) {
        if (used[elem] == 0) {
            dfs(elem);
        }
    }
    t.push_back(v);
}
void top_sort() {
    used.resize(n);
    for (int i = 0; i < n; i++) {
        if (used[i] == 0) {
            dfs(i);
        }
    }
}
char ask1() {
    cout << 1 << " " << 1 << endl;
    char c;
    cin >> c;
    if (c == '!') {
        exit(0);
    }
    return c;
}

char ask2(ll i, ll j) {
    cout << i + 1 << " " << j + 1 << endl;
    char c;
    cin >> c;
    if (c == '!') {
        exit(0);
    }
    return c;
}
void solve() {
    cin >> n;
    g.resize(n);
    vector<ll> a(n);
    ll i = 0;
```

```
while (i != n) {
    for (int j = 1; j < n - i; j++) {
        char c = ask2(1, j);
        if (c == '>') {
            g[j + i].push_back(i);
        }
        else {
            g[i].push_back(j + i);
        }
        for (int c = 0; c < n - 1; c++) {
            ask1();
        }
        ask2(1, j);
        for (int c = 0; c < n - 1; c++) {
            ask1();
        }
    }
    ask1();
    i++;
}
```

```
top_sort();
for (int i = 0; i < n; i++) {
    a[t[i]] = i;
}
deque<ll> d;
for (auto elem : a) {
    d.push_back(elem);
}
while (d.front() != n - 1) {
    ask1();
    ll i = d.front();
    d.pop_front();
    d.push_back(i);
}
while (true) {
    bool f = 0;
    for (int i = 0; i < n; i++) {
        if (f) {
            break;
        }
        if (d[i] != n - i - 1) {
            f = 1;
```

```
                for (int j = 0; j < n; j++) {
                    if (d[j] == n - i - 1) {
                        swap(d[i], d[j]);
                        ask2(i, j);
                        break;
                    }
                }
            }
            if (f) {
                break;
            }
        }
        if (f == 0) {
            break;
        }
        for (int i = 0; i < n - 1; i++) {
            ask1();
        }
    }

}

int main() {
    solve();
}
```

Task F

```
#include <cmath>
#include <iomanip>
#include <iostream>
#include <cmath>
#include <algorithm>
#include <queue>
#include <set>
#include <string>
#include <vector>
using namespace std;

using ll = long long;



int main() {
  ll w, h;
  cin >> h >> w;
  vector<vector<ll>> a(h, vector<ll>(w));
  vector<vector<char>> ans(h, vector<char>(w, '.'));
  ll now = 0;
  for (int i = 0; i < h; i++) {
    string s;
    cin >> s;
    for (int j = 0; j < w; j++) {
```

```
    a[i][j] = s[j] - '0';
    now = max(now, a[i][j]);
  }

}
ll cnt = 0;
while (now != 0) {
  for (int i = 0; i < h; i++) {
    for (int j = 0; j < w; j++) {
      if (a[i][j] == now && ans[i][j] == '.') {
        ll cu = -1;
        ll u = i;
        if (i == 0) {
          u = h - i - 1;
        }
        else {
          u = i - 1;
        }
        ll d = i;
        if (i == h - 1) {
          d = 0;
        }
        else {
          d = i + 1;
        }


        ll l = j;
        if (j == 0) {
          l = w - j - 1;
        }
        else {
          l = j - 1;
        }
        ll r = j;
        if (j == w - 1) {
          r = 0;
        }
        else {
          r = j + 1;
        }

        ll cd = -1;
        ll cr = -1;
        ll cl = -1;
        if (ans[u][j] == '.') {
          cu = now * a[u][j];
        }
        if (ans[d][j] == '.') {
          cd = now * a[d][j];
        }
        if (ans[i][l] == '.') {
          cl = now * a[i][l];
```

```
            }

            if (ans[i][r] == '.') {
              cr = now * a[i][r];
            }

            ll maxi = -1;
            maxi = max(max(cr, cl), max(cu, cd));
            if (maxi != -1) {
              cnt += maxi;
              if (maxi == cr) {
                ans[i][j] = 'L';
                ans[i][r] = 'R';
              }
              else if (maxi == cl) {
                ans[i][j] = 'R';
                ans[i][l] = 'L';
              }
              else if (maxi == cu) {
                ans[i][j] = 'B';
                ans[u][j] = 'T';
              }
              else {
                ans[i][j] = 'T';
                ans[d][j] = 'B';
              }
            }
          }
        }
      }
      now--;
    }
    cout << cnt << endl;
    for (int i = 0; i < h; i++) {
      for (int j = 0; j < w; j++) {
        cout << ans[i][j];
      }
      cout << endl;
    }
  }
```