Олимпиада СПбГУ
по информатике
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A	B	C	D	E	F	sum
100	100	40	100	20	67	427

Task A

```
#include <bits/stdc++.h>
//#include <ext/pb_ds/assoc_container.hpp>
//using namespace __gnu_pbds;

//#pragma comment(linker, "/stack:200000000")
//#pragma GCC optimize("Ofast")
//#pragma GCC target_tbl("sse,sse2,sse3,ssse3,sse4,popcnt,abm,mmx,avx,
    tune=native")

using namespace std;

#define int long long
#define ll long long
#define ld long double
#define all(a) a.begin(), a.end()
#define rall(a) a.rbegin(), a.rend()
#define line cout << '\n'

#define sz(v) ((int)(v).size())
const double pi = 3.14159265358979323846264338327 95;

const long long mod = 1e9 + 7;
const long long inf = 4099999999999999999;
const long long nmax = 5e5 + 100;
const long long Q = 100;
```

```
random_device rd;
mt19937 rnd(chrono::high_resolution_clock::now().time_since_epoch().count
    ());

vector<int> f(81, 1);

int binpow(int a, int n) {
  if (n == 0) return 1;
  if (n == 1) return a * binpow(a, n - 1) % mod;
  else {
  int b = binpow(a, n / 2);
  return b * b % mod;
  }
}
int inv(int x) {
  return binpow(x, mod - 2);
}

int C(int n, int k) {
  return f[n] / (f[n - k] * f[k]);
}

int stress(int a, int b, int n) {
  int ans = 0;
  if (a > n) return 0;
  for (int mask = 1; mask < (1LL << n); mask++) {
  bool flag = true;
  int last = -1, first = -1;
  for (int i = 0; i < n; i++) {
    if ((mask >> i) & 1) {
    if (first == -1) first = last = i;
    else {
      if (i - last != a && i - last != b) {
      flag = false;
      break;
      }
      last = i;
    }
    }
  }

  if (flag && ((first == last && (n == a || n == b)) || (n + first - last
     == a || n + first - last == b)))
    ans++;
  }
  return ans;
}

void runtimeerror() {
  int a, b, n;
//  n = rnd() % 8 + 1;
//  a = rnd() % n + 1;
//  b = rnd() % 3 + a + 1;
```

```
  cin >> a >> b >> n;
//  int pr = stress(a, b, n);

  int ans = 0;
  for (int s = 1; s <= b && s <= n; s++) {
  vector<int> dp(n + 1);
  dp[s] = 1;
  for (int i = s + 1; i <= n; i++) {
    if (i - a >= 1) dp[i] += dp[i - a];
    if (i - b >= 1) dp[i] += dp[i - b];
  }
  if (n + s - a >= 1 && n + s - a <= n) {
    ans += dp[n + s - a];
  }
  if (n + s - b >= 1 && n + s - b <= n) {
    ans += dp[n + s - b];
  }
  }

  cout << ans << '\n';
}

signed main() {
  ios_base::sync_with_stdio(false);
  cin.tie(0);
  cout.tie(0);

//  freopen("input.txt", "r", stdin);

  int t_ = 1;
//  cin >> t_;
  while (t_--)
  runtimeerror();
//  cout << "WINNER";
//  I'm stupid man
}
```

Task B

```
#include <bits/stdc++.h>
//#include <ext/pb_ds/assoc_container.hpp>
//using namespace __gnu_pbds;

//#pragma comment(linker, "/stack:200000000")
//#pragma GCC optimize("Ofast")
//#pragma GCC target_tbl("sse,sse2,sse3,ssse3,sse4,popcnt,abm,mmx,avx,
    tune=native")

using namespace std;

#define int long long
#define ll long long
```

```
#define ld long double
#define all(a) a.begin(), a.end()
#define rall(a) a.rbegin(), a.rend()
#define line cout << '\n'

#define sz(v) ((int)(v).size())
const double pi = 3.14159265358979323846264338327 95;

const long long mod = 1e9 + 7;
const long long inf = 4099999999999999999;
const long long nmax = 5e5 + 100;
const long long Q = 100;

random_device rd;
mt19937 rnd(chrono::high_resolution_clock::now().time_since_epoch().count
    ());

void runtimeerror() {
  int n, x1, y1, z1, x2, y2, z2;
  cin >> n;
  cin >> x1 >> y1 >> z1;
  cin >> x2 >> y2 >> z2;

  int ans = inf;
  ans = min(ans, max({ abs(x1 - x2), abs(y1 - y2), abs(z1 - z2) }));
  {
  // x == n
  for (int Y = 0; Y >= -n; Y--) {
    int x = n, y = Y, z = -(x + y);
    int res = max({abs(x1 - x), abs(y1 - y), abs(z1 - z)});
    x = -x;
    y = y + n;
    z = z + n;
    res += max({abs(x2 - x), abs(y2 - y), abs(z2 - z)});
    ans = min(ans, res);
  }
  }
  {
  // x == -n
  for (int Y = 0; Y <= n; Y++) {
    int x = -n, y = Y, z = -(x + y);
    int res = max({abs(x1 - x), abs(y1 - y), abs(z1 - z)});
    x = -x;
    y = y - n;
    z = z - n;
    res += max({abs(x2 - x), abs(y2 - y), abs(z2 - z)});
    ans = min(ans, res);
  }
  }

  {
  // y == n
  for (int X = 0; X >= -n; X--) {
```

```
      int x = X, y = n, z = -(x + y);
      int res = max({abs(x1 - x), abs(y1 - y), abs(z1 - z)});
      x = x + n;
      y = -y;
      z = z + n;
      res += max({abs(x2 - x), abs(y2 - y), abs(z2 - z)});
      ans = min(ans, res);
    }
    }
    {
    // y == -n
    for (int X = 0; X <= n; X++) {
      int x = X, y = -n, z = -(x + y);
      int res = max({abs(x1 - x), abs(y1 - y), abs(z1 - z)});
      x = x - n;
      y = -y;
      z = z - n;
      res += max({abs(x2 - x), abs(y2 - y), abs(z2 - z)});
      ans = min(ans, res);
    }
    }

    {
    // z == n
    for (int X = 0; X >= -n; X--) {
      int x = X, z = n, y = -(x + z);
      int res = max({abs(x1 - x), abs(y1 - y), abs(z1 - z)});
      x = x + n;
      y = y + n;
      z = -z;
      res += max({abs(x2 - x), abs(y2 - y), abs(z2 - z)});
      ans = min(ans, res);
    }
    }
    {
    // z == -n
    for (int X = 0; X <= n; X++) {
      int x = X, z = -n, y = -(x + z);
      int res = max({abs(x1 - x), abs(y1 - y), abs(z1 - z)});
      x = x - n;
      y = y - n;
      z = -z;
      res += max({abs(x2 - x), abs(y2 - y), abs(z2 - z)});
      ans = min(ans, res);
    }
    }

    cout << ans;
  }

  signed main() {
    ios_base::sync_with_stdio(false);
    cin.tie(0);
```

```
  cout.tie(0);

//  freopen("input.txt", "r", stdin);

  int t_ = 1;
//  cin >> t_;
  while (t_--)
  runtimeerror();
//  cout << "WINNER";
//  I'm stupid man
}
```

Task C

```
#include <bits/stdc++.h>
//#include <ext/pb_ds/assoc_container.hpp>
//using namespace __gnu_pbds;

//#pragma comment(linker, "/stack:200000000")
//#pragma GCC optimize("Ofast")
//#pragma GCC target_tbl("sse,sse2,sse3,ssse3,sse4,popcnt,abm,mmx,avx,
    tune=native")

using namespace std;

#define int long long
#define ll long long
#define ld long double
#define all(a) a.begin(), a.end()
#define rall(a) a.rbegin(), a.rend()
#define line cout << '\n'

#define sz(v) ((int)(v).size())
const double pi = 3.14159265358979323846264338327 95;

const long long mod = 1e9 + 7;
const long long inf = 4099999999999999999;
const long long nmax = 1e5 + 100;
const long long Q = 100;

random_device rd;
mt19937 rnd(chrono::high_resolution_clock::now().time_since_epoch().count
    ());

void first() {
  int n;
  cin >> n;
  string s;
  cin >> s;
  if (n <= 100)
  cout << s << endl;
```

```
  else
  cout << '#' << endl;
}

void second() {
  int n;
  cin >> n;
  string s, t;
  cin >> s >> t;
  if (n <= 100) {
  if (sz(s) != sz(t)) {
    cout << "NO" << endl;
    return;
  }
  for (int i = 0; i < n; i++) {
    string buf;
    for (int j = i; j < n; j++)
    buf += t[j];
    for (int j = 0; j < i; j++)
    buf += t[j];
    if (buf == s) {
    cout << "YES" << endl;
    return;
    }
  }
  cout << "NO" << endl;
  } else {
  cout << "YES" << endl;
  }
}

void runtimeerror() {
  string t;
  cin >> t;
  if (t == "first") first();
  else second();
}

signed main() {
  ios_base::sync_with_stdio(false);
  cin.tie(0);
  cout.tie(0);

//  freopen("input.txt", "r", stdin);

  int t_ = 1;
//  cin >> t_;
  while (t_--)
  runtimeerror();
//  cout << "WINNER";
//  I'm stupid man
}
```

Task D

```
#include <bits/stdc++.h>
//#include <ext/pb_ds/assoc_container.hpp>
//using namespace __gnu_pbds;

//#pragma comment(linker, "/stack:200000000")
//#pragma GCC optimize("Ofast")
//#pragma GCC target_tbl("sse,sse2,sse3,ssse3,sse4,popcnt,abm,mmx,avx,
    tune=native")

using namespace std;

#define int long long
#define ll long long
#define ld long double
#define all(a) a.begin(), a.end()
#define rall(a) a.rbegin(), a.rend()
#define line cout << '\n'

#define sz(v) ((int)(v).size())
const double pi = 3.14159265358979323846264338327 95;

const long long mod = 1e9 + 7;
const long long inf = 4099999999999999999;
const long long nmax = 5e5 + 100;
const long long Q = 100;

random_device rd;
mt19937 rnd(chrono::high_resolution_clock::now().time_since_epoch().count
    ());

char ask(int i, int j) {
  cout << i << ' ' << j << endl;
  char c;
  cin >> c;
  if (c == '!')
  exit(0);
  return c;
}

void runtimeerror() {
  int n;
  cin >> n;
  while (true) {
  char c = '#';
  for (int i = 1; i <= n - 1; i++) {
    if (c == '#') c = ask(1, 1);
    if (c == '>') c = ask(1, n);
    else c = ask(1, 1);
  }
  }
```

```
  cout << endl;
}

signed main() {
  ios_base::sync_with_stdio(false);
  cin.tie(0);
  cout.tie(0);

//  freopen("input.txt", "r", stdin);

  int t_ = 1;
//  cin >> t_;
  while (t_--)
  runtimeerror();
//  cout << "WINNER";
//  I'm stupid man
}
```

Task E

```
#include <bits/stdc++.h>
//#include <ext/pb_ds/assoc_container.hpp>
//using namespace __gnu_pbds;

//#pragma comment(linker, "/stack:200000000")
//#pragma GCC optimize("Ofast")
//#pragma GCC target_tbl("sse,sse2,sse3,ssse3,sse4,popcnt,abm,mmx,avx,
    tune=native")

using namespace std;

#define int long long
#define ll long long
#define ld long double
#define all(a) a.begin(), a.end()
#define rall(a) a.rbegin(), a.rend()
#define line cout << '\n'

#define sz(v) ((int)(v).size())
const double pi = 3.14159265358979323846264338327 95;

const long long mod = 1e9 + 7;
const long long inf = 4099999999999999999;
const long long nmax = 1e5 + 100;
const long long Q = 100;

random_device rd;
mt19937 rnd(chrono::high_resolution_clock::now().time_since_epoch().count
    ());

vector<vector<int>> g(nmax);
```

```
vector<int> t(nmax), it(nmax);
int timer = 0;

void dfs(int v) {
  if (timer >= nmax) return;
  t[timer++] = v;
  if (timer >= nmax) return;
  it[v] %= sz(g[v]);
  dfs(g[v][it[v]++]);
}

void runtimeerror() {
  int n, q;
  cin >> n >> q;
  for (int i = 1; i <= n; i++) {
  int k;
  cin >> k;
  while (k--) {
    int to;
    cin >> to;
    g[i].emplace_back(to);
  }
  }

  dfs(1);

  while (q--) {
  int v;
  cin >> v;
  cout << t[v] << ' ';
  }
}

signed main() {
  ios_base::sync_with_stdio(false);
  cin.tie(0);
  cout.tie(0);

//  freopen("input.txt", "r", stdin);

  int t_ = 1;
//  cin >> t_;
  while (t_--)
  runtimeerror();
//  cout << "WINNER";
//  I'm stupid man
}
```

Task F

```
#include <bits/stdc++.h>
//#include <ext/pb_ds/assoc_container.hpp>
```

```
//using namespace __gnu_pbds;

//#pragma comment(linker, "/stack:200000000")
//#pragma GCC optimize("Ofast")
//#pragma GCC target_tbl("sse,sse2,sse3,ssse3,sse4,popcnt,abm,mmx,avx,
    tune=native")

using namespace std;

#define int long long
#define ll long long
#define ld long double
#define all(a) a.begin(), a.end()
#define rall(a) a.rbegin(), a.rend()
#define line cout << '\n'

#define sz(v) ((int)(v).size())
const double pi = 3.14159265358979323846264338327 95;

const long long mod = 1e9 + 7;
const long long inf = 4099999999999999999;
const long long nmax = 1e5 + 100;
const long long Q = 100;

random_device rd;
mt19937 rnd(chrono::high_resolution_clock::now().time_since_epoch().count
    ());

void runtimeerror() {
  int n, m;
  cin >> n >> m;
  vector<vector<int>> arr(n, vector<int> (m));
  for (int i = 0; i < n; i++) {
  string s;
  cin >> s;
  for (int j = 0; j < m; j++)
    arr[i][j] = s[j] - '0';
  }
  int res = 0;
  vector<string> ans(n, string(m, '.'));
  for (int i = 0; i < n - 1; i += 2) {
  for (int j = 0; j < m - 1; j += 2) {
    if (arr[i][j] * arr[i + 1][j] + arr[i][j + 1] * arr[i + 1][j + 1] >=
    arr[i][j] * arr[i][j + 1] + arr[i + 1][j] * arr[i + 1][j + 1]) {
    ans[i][j] = ans[i][j + 1] = 'T';
    ans[i + 1][j] = ans[i + 1][j + 1] = 'B';
    res += arr[i][j] * arr[i + 1][j] + arr[i][j + 1] * arr[i + 1][j + 1];
    } else {
    ans[i][j] = ans[i + 1][j] = 'L';
    ans[i][j + 1] = ans[i + 1][j + 1] = 'R';
    res += arr[i][j] * arr[i][j + 1] + arr[i + 1][j] * arr[i + 1][j + 1];
    }
  }
```

```
  }
  if (m & 1) {
  for (int i = 0; i < n; i += 2) {
    res += arr[i][m - 1] * arr[i + 1][m - 1];
    ans[i][m - 1] = 'T';
    ans[i + 1][m - 1] = 'B';
  }
  }
  if (n & 1) {
  for (int j = 0; j < m; j += 2) {
    if (ans[n - 1][j] == ans[n - 1][j + 1] && ans[n - 1][j] == '.') {
    res += arr[n - 1][j] * arr[n - 1][j + 1];
    ans[n - 1][j] = 'L';
    ans[n - 1][j + 1] = 'R';
    }
  }
  }

  cout << res << '\n';
  for (auto e : ans)
  cout << e << '\n';
}

signed main() {
  ios_base::sync_with_stdio(false);
  cin.tie(0);
  cout.tie(0);

//  freopen("input.txt", "r", stdin);

  int t_ = 1;
//  cin >> t_;
  while (t_--)
  runtimeerror();
//  cout << "WINNER";
//  I'm stupid man
}
```