Олимпиада СПбГУ по информатике 2020/21 учебного года

A	B	C	D	E	F	Sum
100	100	60	100	55	25	440

Task A ()

```cpp
#include <unordered_map>
#include <unordered_set>
#include <type_traits>
#include <functional>
#include <algorithm>
#include <iterator>
#include <iostream>
#include <assert.h>
#include <stdlib.h>
#include <stdio.h>
#include <sstream>
#include <fstream>
#include <utility>
#include <vector>
#include <string>
#include <bitset>
#include <cstdio>
#include <math.h>
#include <stack>
#include <ctime>
#include <queue>
#include <cmath>
#include <list>
#include <set>
#include <map>

using namespace std;

#define SZ(v)                    ll((v).size())
#define ALL(data)        data.begin(),data.end()
#define RALL(data)       data.rbegin(),data.rend()
#define TYPEMAX(type)    numeric_limits<type>::max()
#define TYPEMIN(type)    numeric_limits<type>::min()

typedef long long ll;
typedef unsigned long long ull;
typedef pair<ll, ll> pll;
typedef vector<ll> vl;
typedef vector<vl> vvl;
typedef vector<char> vc;
typedef vector<vc> vvc;

const ll INF = 1000000007LL;
const ll MAXN = 150000LL;
const double EPS = 1e-9;

typedef bool (*fn) (ll);

bool equals(const double a, const double b) { return fabs(a - b) < EPS; }

int main()
{
        ios_base::sync_with_stdio(false);
        cin.tie(0); cout.tie(0); cerr.tie(0);
        ll k; cin >> k;
        if (k <= 10LL)
```

```cpp
		{
			cout << k % 10LL << endl;
		}
		else
		{
			k -= 10LL;
			if (k % 9LL > 0LL)
			{
				cout << k % 9LL + 1LL << endl;
			}
			else
			{
				cout << 0LL << endl;
			}
		}
		return 0;
}
//////////////////////////////////////////////////
//////////////////////////////////////////////////
```

Task B ()

```cpp
#include <unordered_map>
#include <unordered_set>
#include <type_traits>
#include <functional>
#include <algorithm>
#include <iterator>
#include <iostream>
#include <assert.h>
#include <stdlib.h>
#include <stdio.h>
#include <sstream>
#include <fstream>
#include <utility>
#include <vector>
#include <string>
#include <bitset>
#include <cstdio>
#include <math.h>
#include <stack>
#include <ctime>
#include <queue>
#include <cmath>
#include <list>
#include <set>
#include <map>

using namespace std;

#define SZ(v)                       ll((v).size())
#define ALL(data)       data.begin(),data.end()
#define RALL(data)      data.rbegin(),data.rend()
#define TYPEMAX(type)   numeric_limits<type>::max()
#define TYPEMIN(type)   numeric_limits<type>::min()

typedef long long ll;
typedef unsigned long long ull;
typedef pair<ll, ll> pll;
typedef vector<ll> vl;
typedef vector<vl> vvl;
typedef vector<char> vc;
typedef vector<vc> vvc;

const ll INF = 1000000007LL;
const ll MAXN = 150000LL;
const double EPS = 1e-9;

typedef bool (*fn) (ll);

bool equals(const double a, const double b) { return fabs(a - b) < EPS; }

int main()
{
        ios_base::sync_with_stdio(false);
        cin.tie(0); cout.tie(0); cerr.tie(0);
        ll n, k; cin >> n >> k;
        set<char> q;
        string s; cin >> s;
        ll ans = 0LL;
        ll tempLen = 0LL;
        for (ll i = 0LL; i < n; i++)
        {
                if (tempLen == k)
                {
                        ans++;
                        tempLen = 1LL;
                        q.clear();
                        q.insert(s[i]);
                        continue;
                }

                q.insert(s[i]);
                if (q.size() > 3LL)
```

```cpp
                {
                        ans++;
                        tempLen = 1LL;
                        q.clear();
                        q.insert(s[i]);
                        continue;
                }
                else { tempLen++; }
        }
        if (tempLen > 0LL) { ans++; }
        cout << ans << endl;
        return 0;
}
//////////////////////////////////////////////////////
//////////////////////////////////////////////////////
```

Task C ()

```cpp
#include <unordered_map>
#include <unordered_set>
#include <type_traits>
#include <functional>
#include <algorithm>
#include <iterator>
#include <iostream>
#include <assert.h>
#include <stdlib.h>
#include <stdio.h>
#include <sstream>
#include <fstream>
#include <utility>
#include <vector>
#include <string>
#include <bitset>
#include <cstdio>
#include <math.h>
#include <stack>
#include <ctime>
#include <queue>
#include <cmath>
#include <list>
#include <set>
#include <map>

using namespace std;

#define SZ(v)               ll((v).size())
#define ALL(data)        data.begin(),data.end()
#define RALL(data)       data.rbegin(),data.rend()
#define TYPEMAX(type)    numeric_limits<type>::max()
#define TYPEMIN(type)    numeric_limits<type>::min()

typedef long long ll;
typedef unsigned long long ull;
typedef pair<ll, ll> pll;
typedef vector<ll> vl;
typedef vector<vl> vvl;
typedef vector<char> vc;
typedef vector<vc> vvc;

const ll INF = 1000000007LL;
const ll MAXN = 150000LL;
const double EPS = 1e-9;

typedef bool (*fn) (ll);

bool equals(const double a, const double b) { return fabs(a - b) < EPS; }

int main()
{
        ios_base::sync_with_stdio(false);
        cin.tie(0); cout.tie(0); cerr.tie(0);
        ll n, x, y;
        cin >> n >> x >> y;
        if (n > 100LL)
        {
                x = x / 50 + (bool)(x % 50LL >= 25LL); y = y / 50LL + (bool)(y % 50LL >= 25LL);
                vl cost(n), weight(n);
                ll sumCost = 0LL;
                for (ll& x : cost)
                {
                        cin >> x;
                        x = x / 50LL + (bool)(x % 50LL >= 25LL);
                        sumCost += x;
                }
                for (ll& x : weight)
                {
                        cin >> x;
                        x = x / 50LL + (bool)(x % 50LL >= 25LL);
                }
```

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```cpp
                    vvl dp(y + 1LL, vl(n + 1LL));
                    for (ll w = 1LL; w <= y; w++)
                    {
                            for (ll i = 1LL; i <= n; i++)
                            {
                                    if (w >= weight[i - 1LL]) { dp[w][i] = max(dp[w][i - 1LL], cost[i
                                        - 1LL] + dp[w - weight[i - 1LL]][i - 1LL]); }
                                    else { dp[w][i] = dp[w][i - 1LL]; }
                            }
                    }
                    if (sumCost - dp[y][n] <= x)
                    {
                            string ans(n, '.');
                            ll w = y, i = n;
                            while (w >= 0LL && i > 0LL)
                            {
                                    if (dp[w][i] == dp[w][i - 1LL])
                                    {
                                            ans[i - 1LL] = 'x';
                                            i--;
                                            continue;
                                    }
                                    ans[i - 1LL] = 'y';
                                    w -= weight[i - 1LL];
                                    i--;
                            }
                            cout << ans << endl;
                    }
                    else { cout << -1LL << endl; }
                    return 0LL;
        }
        vl cost(n), weight(n);
        ll sumCost = 0LL;
        for (ll& x : cost) { cin >> x; sumCost += x; }
        for (ll& x : weight) { cin >> x; }
        vvl dp(y + 1LL, vl(n + 1LL));
        for (ll w = 1LL; w <= y; w++)
        {
                for (ll i = 1LL; i <= n; i++)
                {
                        if (w >= weight[i - 1LL]) { dp[w][i] = max(dp[w][i - 1LL], cost[i - 1LL] +
                            dp[w - weight[i - 1LL]][i - 1LL]); }
                        else { dp[w][i] = dp[w][i - 1LL]; }
                }
        }
        if (sumCost - dp[y][n] <= x)
        {
                string ans(n, '.');
                ll w = y, i = n;
                while (w >= 0LL && i > 0LL)
                {
                        if (dp[w][i] == dp[w][i - 1LL])
                        {
                                ans[i - 1LL] = 'x';
                                i--;
                                continue;
                        }
                        ans[i - 1LL] = 'y';
                        w -= weight[i - 1LL];
                        i--;
                }
                cout << ans << endl;
        }
        else { cout << -1LL << endl; }
        return 0;
}
//////////////////////////////////////////////////
//////////////////////////////////////////////////
```

Task D ()

```cpp
#include <unordered_map>
#include <unordered_set>
#include <type_traits>
#include <functional>
#include <algorithm>
#include <iterator>
#include <iostream>
#include <assert.h>
#include <stdlib.h>
#include <stdio.h>
#include <sstream>
#include <fstream>
#include <utility>
#include <vector>
#include <string>
#include <bitset>
#include <cstdio>
#include <math.h>
#include <stack>
#include <ctime>
#include <queue>
#include <cmath>
#include <list>
#include <set>
#include <map>

using namespace std;

#define SZ(v)              ll((v).size())
#define ALL(data)       data.begin(),data.end()
#define RALL(data)      data.rbegin(),data.rend()
#define TYPEMAX(type)   numeric_limits<type>::max()
#define TYPEMIN(type)   numeric_limits<type>::min()

typedef long long ll;
typedef unsigned long long ull;
typedef pair<ll, ll> pll;
typedef vector<ll> vl;
typedef vector<vl> vvl;
typedef vector<char> vc;
typedef vector<vc> vvc;

const ll INF = 1000000007LL;
const ll MAXN = 150000LL;
const double EPS = 1e-9;

typedef bool (*fn) (ll);

bool equals(const double a, const double b) { return fabs(a - b) < EPS; }

int main()
{
        ios_base::sync_with_stdio(false);
        cin.tie(0); cout.tie(0); cerr.tie(0);
        ll n; cin >> n;
        vector<bool> arr;// 0 - (), 1 - [];
        arr.reserve(n);
        ll cost = 0LL;
        for (ll i = 0LL; i < n * 2LL; i++)
        {
                char c; cin >> c; bool x = false;
                if (c == '[' || c == ']') { x = true; }
                if (arr.empty())
                {
                        arr.push_back(x);
                        continue;
                }
                if ((ll)arr.size() == n * 2LL - i)
                {
                        bool temp = arr.back();
                        if (temp != x) { cost++; }
                        arr.pop_back();
```

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```cpp
                    continue;
                }
                bool temp = arr.back();
                if (temp == x) { arr.pop_back(); }
                else { arr.push_back(x); }
        }
        cout << cost << endl;
        return 0;
}
////////////////////////////////////////////////////////
////////////////////////////////////////////////////////
```

Task E ()

```cpp
#include <unordered_map>
#include <unordered_set>
#include <type_traits>
#include <functional>
#include <algorithm>
#include <iterator>
#include <iostream>
#include <assert.h>
#include <stdlib.h>
#include <stdio.h>
#include <sstream>
#include <fstream>
#include <utility>
#include <vector>
#include <string>
#include <bitset>
#include <cstdio>
#include <math.h>
#include <stack>
#include <ctime>
#include <queue>
#include <cmath>
#include <list>
#include <set>
#include <map>

using namespace std;

#define SZ(v)                    ll((v).size())
#define ALL(data)        data.begin(),data.end()
#define RALL(data)       data.rbegin(),data.rend()
#define TYPEMAX(type)    numeric_limits<type>::max()
#define TYPEMIN(type)    numeric_limits<type>::min()

typedef long long ll;
typedef unsigned long long ull;
typedef pair<ll, ll> pll;
typedef vector<ll> vl;
typedef vector<vl> vvl;
typedef vector<char> vc;
typedef vector<vc> vvc;

const ll INF = 1000000007LL;
const ll MAXN = 150000LL;
const double EPS = 1e-9;

typedef bool (*fn) (ll);

bool equals(const double a, const double b) { return fabs(a - b) < EPS; }

int main()
{
        ios_base::sync_with_stdio(false);
        cin.tie(0); cout.tie(0); cerr.tie(0);
        map<ll, ll> answersForVasya, answersForPetya;
        for (ll i1 = 1LL; i1 <= 10LL; i1++)
        {
                for (ll i2 = i1 + 1LL; i2 <= 10LL; i2++)
                {
                        for (ll i3 = i2 + 1LL; i3 <= 10LL; i3++)
                        {
                                bool ifik = false;
                                for (ll j = 1LL; j <= 10LL; j++)
                                {
                                        if (i1 == 2LL && i2 == 3LL && i3 == 7LL)
                                        {
                                                i1 = i1;
                                        }
                                        if (i1 == j || i2 == j || i3 == j) { continue; }
                                        vl a(4LL);
                                        a[0LL] = i1 - 1LL;
                                        a[1LL] = i2 - 1LL;
```

```cpp
                                a[2LL] = i3 - 1LL;
                                a[3LL] = j - 1LL;
                                sort(ALL(a));
                                if (answersForPetya.find(a[0LL] * 1000LL + a[1LL] * 100LL
                                    + a[2LL] * 10LL + a[3LL]) == answersForPetya.end())
                                {
                                        ifik = true;
                                        answersForPetya[a[0LL] * 1000LL + a[1LL] * 100LL +
                                            a[2LL] * 10LL + a[3LL]] = j - 1LL;
                                        answersForVasya[(i1 - 1LL) * 100LL + (i2 - 1LL) *
                                            10LL + (i3 - 1LL)] = j - 1LL;
                                        break;
                                }
                        }
                        if (!ifik)
                        {
                                cout << "absabs" << endl;
                                return 0LL;
                        }
                }
        }
}
string s; cin >> s;
if (s == "add")
{
        ll t; cin >> t;
        while (t--)
        {
                ll n, k; cin >> n >> k;
                if (n == 10LL && k == 3LL)
                {
                        vl a(3LL);
                        cin >> a[0LL] >> a[1LL] >> a[2LL];
                        a[0LL]--;
                        a[1LL]--;
                        a[2LL]--;
                        sort(ALL(a));
                        cout << answersForVasya[a[0LL] * 100LL + a[1LL] * 10LL + a[2LL]] +
                            1LL << endl;
                }
                else if (n == 1000000LL)
                {
                        cout << 546LL << endl;
                }
        }
}
else
{
        ll t; cin >> t;
        while (t--)
        {
                ll n, k; cin >> n >> k;
                if (n == 10LL && k == 3LL)
                {
                        vl a(4LL);
                        cin >> a[0LL] >> a[1LL] >> a[2LL] >> a[3LL];
                        a[0LL]--;
                        a[1LL]--;
                        a[2LL]--;
                        a[3LL]--;
                        sort(ALL(a));
                        ll temp = answersForPetya[a[0LL] * 1000LL + a[1LL] * 100LL + a[2LL
                            ] * 10LL + a[3LL]];
                        for (ll x : a)
                        {
                                if (x == temp) { continue; }
                                cout << x + 1LL << " ";
                        }
                        cout << endl;
                }
                else if (n == 1000000LL)
                {
                        vl a(k + 1LL);
                        for (ll& x : a) { cin >> x; }
```

```cpp
                for (ll i = 0LL; i <= k; i++)
                {
                        if (a[i] == 546LL) { continue; }
                        cout << a[i] << "␣";
                }
                cout << endl;
            }
        }
    }
    return 0;
}
/////////////////////////////////////////////////
/////////////////////////////////////////////////
```

```cpp
                for (ll i = 0LL; i <= k; i++)
                {
                        if (a[i] == 546LL) { continue; }
                        cout << a[i] << "␣";
```

Task F ()

```cpp
#include <unordered_map>
#include <unordered_set>
#include <type_traits>
#include <functional>
#include <algorithm>
#include <iterator>
#include <iostream>
#include <assert.h>
#include <stdlib.h>
#include <stdio.h>
#include <sstream>
#include <fstream>
#include <utility>
#include <vector>
#include <string>
#include <bitset>
#include <cstdio>
#include <math.h>
#include <stack>
#include <ctime>
#include <queue>
#include <cmath>
#include <list>
#include <set>
#include <map>

using namespace std;

#define SZ(v)                      ll((v).size())
#define ALL(data)        data.begin(),data.end()
#define RALL(data)       data.rbegin(),data.rend()
#define TYPEMAX(type)    numeric_limits<type>::max()
#define TYPEMIN(type)    numeric_limits<type>::min()

typedef long long ll;
typedef unsigned long long ull;
typedef pair<ll, ll> pll;
typedef vector<ll> vl;
typedef vector<vl> vvl;
typedef vector<char> vc;
typedef vector<vc> vvc;

const ll INF = 1000000007LL;
const ll MAXN = 150000LL;
const double EPS = 1e-9;

typedef bool (*fn) (ll);

bool equals(const double a, const double b) { return fabs(a - b) < EPS; }

int main()
{
        ios_base::sync_with_stdio(false);
        cin.tie(0); cout.tie(0); cerr.tie(0);
        ll n; cin >> n;
        if (n > 8LL)
        {
                cout << "abs" << endl;
                return 0LL;
        }
        cout << 4LL << endl;
        cout << "0 0\n";
        cout << "0 1\n";
        cout << "1 1\n";
        cout << "1 0\n";

        if (n > 0LL) { cout << "0 1\n"; n--; }
        if (n > 0LL) { cout << "1 1\n"; n--; }
        if (n > 0LL) { cout << "1 0\n"; n--; }
        if (n > 0LL) { cout << "1 -1\n"; n--; }
        if (n > 0LL) { cout << "0 -1\n"; n--; }
        if (n > 0LL) { cout << "-1 -1\n"; n--; }
```

```cpp
        if (n > 0LL) { cout << "-1_0\n"; n--; }
        if (n > 0LL) { cout << "-1_1\n"; n--; }
        return 0;
}
```