Олимпиада СПбГУ по информатике 2018/19 учебного года

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A	B	C	D	E	F	Sum
100	100	50	60	35	7	352

Task A (100)

```
#include <bits/stdc++.h>
using namespace std;
#define forn(i, n) for (int i = 0; i < n; i++)
typedef long long ll;
typedef long double ld;
//#define int long long
#define fi first
#define se second

void no() {
    cout << "No";
    exit(0);
}

int32_t main() {
    ios_base::sync_with_stdio(0); cin.tie(0); cout.tie(0);
    cout << setprecision(23) << fixed;

    int n, m; cin >> n >> m;
    if (m % n)
        no();
    int x = m / n;
    while (x > 1) {
        if (x % 2)
            no();
        x /= 2;
    }
    cout << "Yes";
    return 0;
}
```

Task B (100)

```cpp
#include <bits/stdc++.h>
using namespace std;
#define forn(i, n) for (int i = 0; i < n; i++)
typedef long long ll;
typedef long double ld;
//#define int long long
#define fi first
#define se second

void no() {
    cout << "No";
    exit(0);
}

int main() {
    ios_base::sync_with_stdio(0); cin.tie(0); cout.tie(0);
    cout << setprecision(23) << fixed;

    int n; cin >> n;
    string s; cin >> s;
    forn(i, s.size()-1) {
        if ((s[i] == 'o' && s[i+1] == 'r')||(s[i] == 'r' && s[i+1] == 'o')) {
            cout << "Yes";
            return 0;
        }
    }
    if (s.size() > 1) {
        forn(i, s.size()-2) {
            if (s[i] == 'o' && s[i+2] == 'r') {
                cout << "Yes";
                return 0;
            }
        }
    }

    no();
    return 0;
}
```

Task C (50)

```cpp
#include <bits/stdc++.h>
using namespace std;
#define forn(i, n) for (int i = 0; i < n; i++)
typedef long long ll;
typedef long double ld;
//#define int long long
#define fi first
#define se second

void no() {
    cout << "No";
    exit(0);
}
vector <int> reb[200000];

int num(int v, int pr) {
    int ans = 0;
    forn(i, reb[v].size()) {
        if (reb[v][i] != pr)
            ans+= num(reb[v][i], v);
    }
    return ans + 1;
}

int ans(int v) {
    int k = 0;
    forn(i, reb[v].size()) {
        k = max(k, num(reb[v][i], v));
    }
    return k + 1;
}

int main() {
    ios_base::sync_with_stdio(0); cin.tie(0); cout.tie(0);
    cout << setprecision(23) << fixed;

    int n; cin >> n;
    int a, b;
    forn(i, n-1) {
        cin >> a >> b; a--, b--;
        reb[a].push_back(b);
        reb[b].push_back(a);
    }

    forn(i, n) {
        cout << ans(i) << ' ';
    }

    return 0;
}
```

Task D (60)

```cpp
#include <bits/stdc++.h>
using namespace std;
#define forn(i, n) for (int i = 0; i < n; i++)
typedef long long ll;
typedef long double ld;
//#define int long long
#define fi first
#define se second
int const s = 9;

void no() {
    cout << "No";
    exit(0);
}

int main() {
    ios_base::sync_with_stdio(0); cin.tie(0); cout.tie(0);
    cout << setprecision(23) << fixed;

    string inp; cin >> inp;
    int t, n, p;
    cin >> t >> n >> p;
    if (n == 3 && p == 7) {
        if (inp == "split") {
            forn(j, t) {
                cin >> inp;
                cout << 'a';
                forn(i, s-3)
                    cout << inp[i];
                cout << " b";
                for (int i = 3; i < s; i++)
                    cout << inp[i];
                cout << " c";
                for (int i = 0; i < 3; i++)
                    cout << inp[i];
                for (int i = 6; i < s; i++)
                    cout << inp[i];
                cout << '\n';
            }
            return 0;
        }

        string a, b;
        forn(j, t) {
            cin >> a >> b;
            if (a[0] == 'a') {
                for (int i = 1; i <= 6; i++)
                    cout << a[i];
                for (int i = 4; i <= 6; i++)
                    cout << b[i];
            }
            if (a[0] == 'b') {
                for (int i = 1; i <= 3; i++)
                    cout << b[i];
                for (int i = 1; i <= 6; i++)
                    cout << a[i];
            }
            if (a[0] == 'c') {
                for (int i = 1; i <= 3; i++)
                    cout << a[i];

                if (b[0] == 'a') {
                    for (int i = 4; i <= 6; i++)
                        cout << b[i];
                }
                if (b[0] == 'b') {
                    for (int i = 1; i <= 3; i++)
                        cout << b[i];
                }
```

```
                for (int i = 4; i <= 6; i++)
                    cout << a[i];
            }
            cout << '\n';
        }
        return 0;
    }

    if (n == 5 && p == 7) {
        if (inp == "split") {
            forn(j, t) {
                cin >> inp;
                cout << 'a';
                forn(k, 2) {
                    forn(i, s-3)
                        cout << inp[i];
                    if (k == 0)
                        cout << "␣a";
                }

                forn(k, 2) {
                    cout << "␣b";
                    for (int i = 3; i < s; i++)
                        cout << inp[i];
                }
                cout << "␣c";
                for (int i = 0; i < 3; i++)
                    cout << inp[i];
                for (int i = 6; i < s; i++)
                    cout << inp[i];
                cout << '\n';
            }
            return 0;
        }

        string a, b, c;
        forn(j, t) {
            cin >> a >> b >> c;
            if (a[0] == b[0]) {
                forn(i, p)
                    b[i] = c[i];
            }
            if (a[0] == 'a') {
                for (int i = 1; i <= 6; i++)
                    cout << a[i];
                for (int i = 4; i <= 6; i++)
                    cout << b[i];
            }
            if (a[0] == 'b') {
                for (int i = 1; i <= 3; i++)
                    cout << b[i];
                for (int i = 1; i <= 6; i++)
                    cout << a[i];
            }
            if (a[0] == 'c') {
                for (int i = 1; i <= 3; i++)
                    cout << a[i];

                if (b[0] == 'a') {
                    for (int i = 4; i <= 6; i++)
                        cout << b[i];
                }
                if (b[0] == 'b') {
                    for (int i = 1; i <= 3; i++)
                        cout << b[i];
                }

                for (int i = 4; i <= 6; i++)
                    cout << a[i];
            }
            cout << '\n';
        }
        return 0;
```

```
    }
}
```

Task E (35)

```cpp
#include <bits/stdc++.h>
using namespace std;
#define forn(i, n) for (int i = 0; i < n; i++)
typedef long long ll;
typedef long double ld;
//#define int long long
#define fi first
#define se second
int const s = 9;

void no() {
    cout << "No";
    exit(0);
}

int main() {
    ios_base::sync_with_stdio(0); cin.tie(0); cout.tie(0);
    cout << setprecision(23) << fixed;

    int n; cin >> n;
    pair <ld, ld> data[n];
    forn(i, n)
        cin >> data[i].fi >> data[i].se;
    ld px, py, qx, qy;
    cin >> px >> py >> qx >> qy;
    if (px == 0 && py == 0 && qy == 0) {
        pair <ld, pair<ld, int> > ord[n];
        forn(i, n) {
            ord[i] = make_pair(data[i].fi, make_pair(-abs(data[i].se), i));
        }
        sort(ord, ord + n);
        forn(i, n) {
            //cout << ord[i].fi << ' ' << ord[i].se.fi << ' ' << ord[i].se.se << '\n';
        }
        if (n >= 2) {
            if (ord[n-1].fi == ord[n-2].fi && ord[n-1].se.fi == ord[n-2].se.fi) {
                cout << -1;
                return 0;
            }
        }
        cout << ord[n-1].se.se + 1;
    }


    return 0;
}
```

Task F (7)

```cpp
#include <bits/stdc++.h>
using namespace std;
#define forn(i, n) for (int i = 0; i < n; i++)
typedef long long ll;
typedef long double ld;
#define int long long
#define fi first
#define se second

long long arr[10000000][3];

void no() {
    cout << "No";
    exit(0);
}

int32_t main() {
    ios_base::sync_with_stdio(0); cin.tie(0); cout.tie(0);
    cout << setprecision(23) << fixed;

    int n, k; cin >> n >> k;
    int data[n][2];
    forn(i, n)
        cin >> data[i][0] >> data[i][1];

    arr[1][0] = 0, arr[1][1] = 0, arr[1][2] = 0;
    ll x = 1 << n; ll uk = 1; ll r;
    for (int i = 1; i < x; i++) {
        r = 1 << uk;
        if (2*i == r)
            uk++;
        int pos = 2*i;
        arr[pos][0] = arr[i][0] + k,
        arr[pos][1] = arr[i][1],
        arr[pos][2] = arr[i][2] + min(arr[pos][0], (ll)data[uk-2][0]) + min(arr[pos][1], (ll)data[
            uk-2][1]);
        arr[pos][0] = max(0ll, arr[pos][0] - data[uk-2][0]),
        arr[pos][1] = max(0ll, arr[pos][1] - data[uk-2][1]);

        pos++;
        if (i == 1) {
            //cout << " meh " << arr[pos][0] << ' ' << arr[pos][1] << ' ' << arr[pos][2] << endl;
        }
        arr[pos][0] = arr[i][0],
        arr[pos][1] = arr[i][1] + k,
        arr[pos][2] = arr[i][2] + min(arr[pos][0], (ll)data[uk-2][0]) + min(arr[pos][1], (ll)data[
            uk-2][1]);
        if (i == 1) {
                //cout << " uk= " << uk << endl;
            //cout << " meh " << arr[pos][0] << ' ' << (ll)data[uk-2][0] << ' ' << arr[pos][1] <<
                ' ' << (ll)data[uk-2][1] << endl;
        }
        arr[pos][0] = max(0ll, arr[pos][0] - data[uk-2][0]),
        arr[pos][1] = max(0ll, arr[pos][1] - data[uk-2][1]);
    }

    ll ans = 0;
    //cout << "OUT:\n";
    for(int i = 1; i < 2*x; i++) {
        //cout << arr[i][0] << ' ' << arr[i][1] << ' ' << arr[i][2] << '\n';
    }
    for (int i = x; i < 2*x; i++) {
        ans = max(ans, (ll)arr[i][2]);
    }
    cout << ans;

    return 0;
}
```