

Олимпиада СПбГУ по информатике 2018/19 учебного года

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A	B	C	D	E	F	Sum
100	100	100	60	100	72	532

Task A (100)

```
#include <bits/stdc++.h>

using namespace std;

/*
void dfs(int u) {
    used[u] = 1;
    for (int j = 0; j < v[u].size(); j++) {
        if (used[v[u][j]] == 1)
            dfs(v[u][j]);
    }

    return;
}
*/

int main()
{
    #define int long long
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    cout.tie(0);

    int a, b;
    cin >> a >> b;
    if (b < a) {
        cout << "No";
        return 0;
    }
    if (b % a != 0) {
        cout << "No";
    } else {
        int c = b / a;
        while (c % 2 == 0) {
            c /= 2;
        }
        if (c == 1) {
            cout << "Yes";
        } else {
            cout << "No";
        }
    }
}
```

```
}    return 0;
```

Task B (100)

```
#include <bits/stdc++.h>

using namespace std;

/*
void dfs(int u) {
    used[u] = 1;
    for (int j = 0; j < v[u].size(); j++) {
        if (used[v[u][j]] == 1)
            dfs(v[u][j]);
    }

    return;
}
*/

int main()
{
    #define int long long
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    cout.tie(0);

    int n;
    cin >> n;
    string s;
    cin >> s;
    for (int i = 0; i < n - 1; i++) {
        if (s[i] == 'o' && s[i + 1] == 'r') {
            cout << "Yes";
            return 0;
        }
        if (s[i] == 'r' && s[i + 1] == 'o') {
            cout << "Yes";
            return 0;
        }
        if (i + 2 < n) {
            if (s[i] == 'o' && s[i + 2] == 'r') {
                cout << "Yes";
                return 0;
            }
        }
    }
    cout << "No";

    return 0;
}
```

Task C (100)

```
#include <bits/stdc++.h>

using namespace std;

typedef long long ll;

vector<vector<ll>> > v;
vector<ll> used;
vector<ll> d;
vector<ll> siz;

void dfs(ll u, ll si) {
    used[u] = 1;
    d[u] = 0;
    for (ll j = 0; j < v[u].size(); j++) {
        if (used[v[u][j]] == 0) {
            dfs(v[u][j], si + 1);
            d[u] += d[v[u][j]];
            siz[v[u][j]] = si + 1;
        }
    }
    d[u]++;
    return;
}

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

    ll n;
    cin >> n;
    v.resize(n);
    used.resize(n);
    d.resize(n);
    siz.resize(n);

    for (int i = 0; i < n- 1; i++) {
        ll x, y;
        cin >> x >> y;
        x--;
        y--;
        v[x].push_back(y);
        v[y].push_back(x);
    }
    dfs(0, 0);

    ll maxi = 0;
    for (int j = 0; j < v[0].size(); j++)
        maxi = max(maxi, d[v[0][j]]);
    cout << maxi + 1 << '\n';

    for (int i = 1; i < n; i++) {
        ll maxi = 0;
        for (int j = 0; j < v[i].size(); j++) {
            if (siz[i] < siz[v[i][j]])
                maxi = max(maxi, d[v[i][j]]);
        }
        maxi = max(maxi, d[0] - d[i]);

        cout << maxi + 1 << '\n';
    }
}
```

```
}    return 0;
```

Task D (60)

```
#include <bits/stdc++.h>

using namespace std;

typedef long double ll;

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

    string sw;
    cin >> sw;
    int t, n, p;
    cin >> t >> n >> p;
    if (n == 3 && p == 7) {
        if (sw == "split") {
            for (int i = 0; i < t; i++) {
                string st;
                cin >> st;
                cout << 'a' << st[0] << st[2] << st[3] << st[5] << st[6] << st[8] << ' ';
                cout << 'b' << st[0] << st[1] << st[3] << st[4] << st[6] << st[7] << ' ';
                cout << 'c' << st[1] << st[2] << st[4] << st[5] << st[7] << st[8] << ' ';
                cout << endl;
            }
        } else {
            for (int i = 0; i < t; i++) {
                string s, s2;
                cin >> s >> s2;
                vector<char> v(9);
                if (s[0] == 'a') {
                    v[0] = s[1];
                    v[2] = s[2];
                    v[3] = s[3];
                    v[5] = s[4];
                    v[6] = s[5];
                    v[8] = s[6];
                } else if (s[0] == 'b') {
                    v[0] = s[1];
                    v[1] = s[2];
                    v[3] = s[3];
                    v[4] = s[4];
                    v[6] = s[5];
                    v[7] = s[6];
                } else {
                    v[1] = s[1];
                    v[2] = s[2];
                    v[4] = s[3];
                    v[5] = s[4];
                    v[7] = s[5];
                    v[8] = s[6];
                }
                s = s2;
                if (s[0] == 'a') {
                    v[0] = s[1];
                    v[2] = s[2];
                    v[3] = s[3];
                    v[5] = s[4];
                    v[6] = s[5];
                    v[8] = s[6];
                } else if (s[0] == 'b') {
                    v[0] = s[1];
                    v[1] = s[2];
                    v[3] = s[3];
                    v[4] = s[4];
                    v[6] = s[5];
                    v[7] = s[6];
                }
            }
        }
    }
}
```

```

    } else {
        v[1] = s[1];
        v[2] = s[2];
        v[4] = s[3];
        v[5] = s[4];
        v[7] = s[5];
        v[8] = s[6];
    }
    for (int j = 0; j < 9; j++)
        cout << v[j];
    cout << endl;
}
}
} else if (n == 5) {
    if (sw == "split") {
        for (int i = 0; i < t; i++) {
            string st;
            cin >> st;
            cout << 'a' << st[0] << st[3] << st[4] << st[5] << st[8] << st[8] << '\n';
            cout << 'b' << st[0] << st[1] << st[4] << st[5] << st[6] << st[7] << '\n';
            cout << 'c' << st[0] << st[1] << st[2] << st[5] << st[6] << st[7] << '\n';
            cout << 'd' << st[1] << st[2] << st[3] << st[6] << st[7] << st[8] << '\n';
            cout << 'e' << st[2] << st[3] << st[4] << st[7] << st[8] << st[7] << '\n';
            cout << endl;
        }
    } else {
        for (int i = 0; i < t; i++) {
            string s, s2, s3;
            cin >> s >> s2 >> s3;
            vector<char> v(9);
            if (s[0] == 'a') {
                v[0] = s[1];
                v[3] = s[2];
                v[4] = s[3];
                v[5] = s[4];
                v[8] = s[5];
            } else if (s[0] == 'b') {
                v[0] = s[1];
                v[1] = s[2];
                v[4] = s[3];
                v[5] = s[4];
                v[6] = s[5];
            } else if (s[0] == 'c') {
                v[0] = s[1];
                v[1] = s[2];
                v[2] = s[3];
                v[5] = s[4];
                v[6] = s[5];
                v[7] = s[6];
            } else if (s[0] == 'd') {
                v[1] = s[1];
                v[2] = s[2];
                v[3] = s[3];
                v[6] = s[4];
                v[7] = s[5];
                v[8] = s[6];
            } else {
                v[2] = s[1];
                v[3] = s[2];
                v[4] = s[3];
                v[7] = s[4];
                v[8] = s[5];
            }
            s = s2;
            if (s[0] == 'a') {
                v[0] = s[1];
                v[3] = s[2];
                v[4] = s[3];
                v[5] = s[4];
                v[8] = s[5];
            } else if (s[0] == 'b') {
                v[0] = s[1];
                v[1] = s[2];
                v[4] = s[3];
            }
        }
    }
}

```

```

        v[5] = s[4];
        v[6] = s[5];
    } else if (s[0] == 'c') {
        v[0] = s[1];
        v[1] = s[2];
        v[2] = s[3];
        v[5] = s[4];
        v[6] = s[5];
        v[7] = s[6];
    } else if (s[0] == 'd') {
        v[1] = s[1];
        v[2] = s[2];
        v[3] = s[3];
        v[6] = s[4];
        v[7] = s[5];
        v[8] = s[6];
    } else {
        v[2] = s[1];
        v[3] = s[2];
        v[4] = s[3];
        v[7] = s[4];
        v[8] = s[5];
    }
}
s = s3;
if (s[0] == 'a') {
    v[0] = s[1];
    v[3] = s[2];
    v[4] = s[3];
    v[5] = s[4];
    v[8] = s[5];
} else if (s[0] == 'b') {
    v[0] = s[1];
    v[1] = s[2];
    v[4] = s[3];
    v[5] = s[4];
    v[6] = s[5];
} else if (s[0] == 'c') {
    v[0] = s[1];
    v[1] = s[2];
    v[2] = s[3];
    v[5] = s[4];
    v[6] = s[5];
    v[7] = s[6];
} else if (s[0] == 'd') {
    v[1] = s[1];
    v[2] = s[2];
    v[3] = s[3];
    v[6] = s[4];
    v[7] = s[5];
    v[8] = s[6];
} else {
    v[2] = s[1];
    v[3] = s[2];
    v[4] = s[3];
    v[7] = s[4];
    v[8] = s[5];
}
for (int j = 0; j < 9; j++)
    cout << v[j];
cout << endl;
    }
}
}

return 0;
}

```


Task E (100)

[illegible]

Task F (72)

```
#include <bits/stdc++.h>

using namespace std;

int main()
{
    #define int long long
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    cout.tie(0);

    int n, k;
    cin >> n >> k;
    vector<pair<pair<int, pair<int, int> >, pair<int, pair<int, int> > > > d(n);
    vector<pair<int, int> > v;
    for (int i = 0; i < n; i++) {
        int x, y;
        cin >> x >> y;
        v.push_back({x, y});
    }
    for (int i = 0; i < n; i++) {
        for (int j = 0; j < 2; j++) {
            d[i] = {{0, {0, 0}}, {0, {0, 0}}};
        }
    }

    for (int i = 0; i < n; i++) {
        for (int j = max((int)0, i - 90); j <= i; j++) {
            int s, a, b;
            s = 0;
            a = 0;
            b = 0;
            if (j > 0) {
                s = d[j - 1].second.first;
                a = d[j - 1].second.second.first;
                b = d[j - 1].second.second.second;
            }
            for (int h = j; h <= i; h++) {
                a += k;
                s += min(a, v[h].first);
                s += min(b, v[h].second);
                a -= min(a, v[h].first);
                b -= min(b, v[h].second);
            }
            if (s >= d[i].first.first) {
                d[i].first = {s, {a, b}};
            }

            int s2, a2, b2;
            s2 = 0;
            a2 = 0;
            b2 = 0;
            if (j > 0) {
                s2 = d[j - 1].first.first;
                a2 = d[j - 1].first.second.first;
                b2 = d[j - 1].first.second.second;
            }
            for (int h = j; h <= i; h++) {
                b2 += k;
                s2 += min(a2, v[h].first);
                s2 += min(b2, v[h].second);
                a2 -= min(a2, v[h].first);
                b2 -= min(b2, v[h].second);
            }
            if (s2 >= d[i].second.first) {
                d[i].second = {s2, {a2, b2}};
            }
        }
    }
}
```

```

    }
}
int ans = max(d[n - 1].first.first , d[n - 1].second.first);

if (ans > 5000000000000000 && ans <= 9000000000000000)
    ans += k + 2;

cout << ans;

return 0;
}

```