Олимпиада СПбГУ по информатике 2018/19 учебного года

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A	B	C	D	E	F	Sum
100	100	100	60	0	7	367

Task A (100)

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

using namespace std;

int main(){
    int n, m;
    cin>>n>>m;
    for(int i = 1;i<200;i*=2){
        if(n*i==m){
            cout<<"Yes";
            return 0;
        }
    }
    cout<<"No";
    return 0;
}
```

Task B (100)

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

using namespace std;

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

Task C (100)

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

using namespace std;

vector<vector<int> > g;
vector<bool>used;
int n;
map<pair<int, int>, int> a;

int dfs(int v) {
    if(used[v]==true)
        return 0;
    used[v] = true;

    int childs = 1;

    for(auto u:g[v]) {
        if(!used[u]) {
            int d = dfs(u);
            childs += d;

            a[make_pair(u, v)] = d;
            a[make_pair(v, u)] = n - d;
            //cout<<(u+1)<<" "<<(v+1)<<" "<<a[make_pair(u,v)]<<endl;
        }
    }

    return childs;
}

int main() {
    cin>>n;
    g = vector<vector<int> >(n);
    used = vector<bool>(n, false);

    for(int i = 1; i<n; i++) {
        int a, b;
        cin>>a>>b;
        a--;
        b--;
        g[a].push_back(b);
        g[b].push_back(a);
    }

    dfs(0);

    for(int i = 0;i<n;i++){
        int ans = 0;
        for(auto u:g[i]){
            ans = max(ans, a[make_pair(u, i)]);
        }
        cout<<(ans+1)<<" ";
    }

    return 0;
}
```

Task D (60)

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

using namespace std;

vector<string> str_to_strarr(string s) {
    vector<string> ans;
    for(int i = 0; i<s.length(); i++) {
        string push = "_";
        push[0] = s[i];
        ans.push_back(push);
    }
    return ans;
}

string update_str(string s){
    if(s[0]=='d')
        s[0] = 's';
    if(s[0]=='f')
        s[0] = 'm';
    return s;
}

int main() {
    string s;
    cin>>s;
    if(s=="split") {
        int t, n, p;
        cin>>t>>n>>p;
        for(int i = 0; i<t; i++) {
            string pas;
            cin>>pas;
            auto pas_str = str_to_strarr(pas);
            if(n==3) {
                string a = "s", b = "m", c = "e";
                a+=pas_str[0] + pas_str[1]+pas_str[2] + pas_str[3]+pas_str[4]+pas_str[5];
                b+=pas_str[0]+pas_str[1]+pas_str[2] + pas_str[6]+pas_str[7]+pas_str[8];
                c+=pas_str[3]+pas_str[4]+pas_str[5] + pas_str[6]+pas_str[7]+pas_str[8];
                cout<<a<<"_"<<b<<"_"<<c<<endl;
            }else if(n==5){
                string a = "s", b = "m", c = "e", d = "d", f = "f";
                a+=pas_str[0] + pas_str[1]+pas_str[2] + pas_str[3]+pas_str[4]+pas_str[5];
                b+=pas_str[0]+pas_str[1]+pas_str[2] + pas_str[6]+pas_str[7]+pas_str[8];
                c+=pas_str[3]+pas_str[4]+pas_str[5] + pas_str[6]+pas_str[7]+pas_str[8];
                d = a;
                d[0] = 'd';
                f = b;
                f[0] = 'f';
                cout<<a<<"_"<<b<<"_"<<c<<"_"<<d<<"_"<<f<<endl;
            }
        }
    } else {
        int t, n, p;
        cin>>t>>n>>p;
        for(int k = 0; k<t; k++)
            if(n==3) {
                string a, b;
                cin>>a>>b;
                auto a_str = str_to_strarr(a);
                auto b_str = str_to_strarr(b);
                vector<string> ans(9, "_");
                if(a[0]=='s') {
                    for(int i = 0; i < 6; i++) {
                        ans[i][0] = a[i + 1];
                    }

                    ans[6][0] = b[4];
                    ans[7][0] = b[5];
                    ans[8][0] = b[6];
```

```cpp
        } else if(a[0]=='m') {
            ans[0][0] = a[1];
            ans[1][0] = a[2];
            ans[2][0] = a[3];

            ans[6][0] = a[4];
            ans[7][0] = a[5];
            ans[8][0] = a[6];

            if(b[0]=='s') {
                ans[3][0] = b[4];
                ans[4][0] = b[5];
                ans[5][0] = b[6];
            } else {
                ans[3][0] = b[1];
                ans[4][0] = b[2];
                ans[5][0] = b[3];
            }
        } else {
            for(int i = 3; i<9; i++) {
                ans[i][0] = a[i - 2];
            }

            ans[0][0] = b[1];
            ans[1][0] = b[2];
            ans[2][0] = b[3];
        }
        for(int i = 0; i < 9; i++) {
            cout<<ans[i];
        }
        cout<<endl;
    }else if(n==5){
        string a, b, c;
        cin>>a>>b>>c;
        a = update_str(a);
        b = update_str(b);
        c = update_str(c);
        if(a[0]==b[0]){
            b = c;
        }
        auto a_str = str_to_strarr(a);
        auto b_str = str_to_strarr(b);
        vector<string> ans(9, "⌣");

        if(a[0]=='s') {
            for(int i = 0; i < 6; i++) {
                ans[i][0] = a[i + 1];
            }

            ans[6][0] = b[4];
            ans[7][0] = b[5];
            ans[8][0] = b[6];
        } else if(a[0]=='m') {
            ans[0][0] = a[1];
            ans[1][0] = a[2];
            ans[2][0] = a[3];

            ans[6][0] = a[4];
            ans[7][0] = a[5];
            ans[8][0] = a[6];

            if(b[0]=='s') {
                ans[3][0] = b[4];
                ans[4][0] = b[5];
                ans[5][0] = b[6];
            } else {
                ans[3][0] = b[1];
                ans[4][0] = b[2];
                ans[5][0] = b[3];
            }
        } else {
            for(int i = 3; i<9; i++) {
                ans[i][0] = a[i - 2];
            }
```

```cpp
            ans[0][0] = b[1];
            ans[1][0] = b[2];
            ans[2][0] = b[3];
        }
        for(int i = 0; i < 9; i++) {
            cout<<ans[i];
        }
        cout<<endl;
    }
  }
}
```

Task E (—)

Task F (7)

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

using namespace std;

#define ans first
#define blue_p second.first
#define red_p second.second

int main() {
    long long n, k;
    cin>>n>>k;
    vector <pair <long long, pair<long long, long long> > > r(n + 1);
    vector<pair<long long, pair<long long, long long> > > b(n + 1);
    b[0].ans = 0;
    b[0].blue_p = 0;
    b[0].red_p = 0;

    r[0].ans = 0;
    r[0].blue_p = 0;
    r[0].red_p = 0;

    for(long long i = 1; i <= n; i++) {
        long long c, d;
        cin>>c>>d;

        //first update red
        r[i].red_p = r[i-1].red_p + k;
        r[i].blue_p = r[i-1].blue_p;
        r[i].ans = r[i-1].ans;
        pair <long long, pair<long long, long long> > r2;
        r2.red_p = b[i-1].red_p + k;
        r2.blue_p = b[i-1].blue_p;
        r2.ans = b[i-1].ans;

        //first update blue
        b[i].red_p = b[i-1].red_p;
        b[i].blue_p = b[i-1].blue_p + k;
        b[i].ans = b[i-1].ans;
        pair <long long, pair<long long, long long> > b2;
        b2.red_p = r[i-1].red_p ;
        b2.blue_p = r[i-1].blue_p + k;
        b2.ans = r[i-1].ans;

        //update red
        if(r[i].red_p>=c) {
            r[i].red_p-=c;
            r[i].ans += c;
        } else {
            r[i].ans +=  r[i].red_p;
            r[i].red_p=0;
        }
        if(r[i].blue_p>=d) {
            r[i].blue_p-=d;
            r[i].ans += d;
        } else {
            r[i].ans +=  r[i].blue_p;
            r[i].blue_p=0;
        }
        //update second red
        if(r2.red_p>=c) {
            r2.red_p-=c;
            r2.ans += c;
        } else {
            r2.ans +=  r2.red_p;
            r2.red_p=0;
        }
        if(r2.blue_p>=d) {
            r2.blue_p-=d;
            r2.ans += d;
```

```cpp
        } else {
            r2.ans +=  r2.blue_p;
            r2.blue_p=0;
        }
        //swap red
        if(r[i].ans<r2.ans) {
            r[i].ans=r2.ans;
            r[i].blue_p = r2.blue_p;
            r[i].red_p = r2.red_p;
        }

        //update blue
        if(b[i].red_p >= c) {
            b[i].red_p -= c;
            b[i].ans += c;
        } else {
            b[i].ans +=  b[i].red_p;
            b[i].red_p = 0;
        }
        if(b[i].blue_p>=d) {
            b[i].blue_p -= d;
            b[i].ans += d;
        } else {
            b[i].ans +=  b[i].blue_p;
            b[i].blue_p = 0;
        }
        //update second blue
        if(b2.red_p>=c) {
            b2.red_p-=c;
            b2.ans += c;
        } else {
            b2.ans +=  b2.red_p;
            b2.red_p=0;
        }
        if(b2.blue_p>=d) {
            b2.blue_p-=d;
            b2.ans += d;
        } else {
            b2.ans +=  b2.blue_p;
            b2.blue_p=0;
        }
        //swap blue
        if(b[i].ans<b2.ans) {
            b[i].ans=b2.ans;
            b[i].blue_p = b2.blue_p;
            b[i].red_p = b2.red_p;
        }


        if(min(c, i * k) > r[i].ans){
            r[i].ans = min(c, i*k);
            r[i].blue_p = 0;
            r[i].red_p = 0;
            if(c < i * k){
                r[i].red_p = i*k-c;
            }
        }
        if(min(d, i * k) > b[i].ans){
            b[i].ans = min(d, i*k);
            b[i].blue_p = 0;
            b[i].red_p = 0;
            if(d < i * k){
                b[i].blue_p = i * k - d;
            }
        }

        //cout<<"---"<<r[i].ans<<" "<<b[i].ans<<endl;
    }

    cout<<max(r[n].ans, b[n].ans);

    return 0;
}
```