

Олимпиада СПбГУ по информатике 2022/23 учебного года

A	B	C	D	E	F	Sum
100	100	100	10	52	0	362

Task A ()

```
#include <bits/stdc++.h>
#define ll long long
#define f first
#define s second
#define ld long double
#define pll pair<ll, ll>
using namespace std;
int main() {
    //freopen("input.txt", "r", stdin);
    //freopen("output.txt", "w", stdout);
    //ios_base::sync_with_stdio(0);
    //cin.tie(0), cout.tie(0);
    ll n = 6;
    vector<ll> v(n);
    vector<ll> ans(n, -1), ans2(n);
    for (ll i = 0; i < n; i++){
        cin >> v[i];
    }
    for (ll i = n-1; i >= 0; i--){
        ll ind = v[i]-1;
        for (ll j = 0; ind >= 0; j++){
            if (ind == 0 && ans[j] == -1){
                ans[j] = i;
                break;
            }
            if (ans[j] == -1) ind--;
        }
    }
    for (ll i = 0; i < n; i++){
        ans2[ans[i]] = i+1;
    }
    for (ll i = 0; i < n; i++) cout << ans2[i] << " ";
    return 0;
}
```

Task B ()

```
#include <bits/stdc++.h>
#define ll long long
#define f first
#define s second
#define ld long double
#define pll pair<ll, ll>
using namespace std;
int main() {
    //freopen("input.txt", "r", stdin);
    //freopen("output.txt", "w", stdout);
    //ios_base::sync_with_stdio(0);
    //cin.tie(0), cout.tie(0);
    string s;
    cin >> s;
    ll n;
    cin >> n;
    vector<ll> v(n);
    for (ll i= 0; i < n; i++)cin >> v[i];
    if (s == "first") {
        ll sum = 0;
        for (ll i= 0; i < n; i++){
            sum += v[i];
        }
        sum *= 100;
        cout << sum;
    }
    else{
        ll ans = 0;
        ll x;
        for (ll i=0 ; i < n; i++){
            ll b = (v[i] - 1) % 100 + 1;
            x = (v[i] - 1) / 100;
            ans += b;
        }
        ans += x;
        cout << ans;
    }
    return 0;
}
```

Task C ()

```

#include <bits/stdc++.h>
#define ll long long
#define f first
#define s second
#define ld long double
#define pll pair<ll, ll>
using namespace std;
vector<pll> v;
set<pll> ans;
void check(vector<vector<bool>> place){
    // for(ll i = 0; i < place.size(); i++){for(ll j = 0; j < place[i].size(); j++)cout << place[i][j] << " ";cout << endl;}cout << endl;
    for(ll i = 0; i < place.size(); i++){
        for(ll j = 0; j < place[i].size(); j++){
            if((i == 0 || !place[i-1][j]) && (j == 0 || !place[i][j-1]) && place[i][j]){
                bool is = true;
                ll w = 1;
                while(j + w < place[i].size() && place[i][j + w])w++;
                ll h = 1;
                while(is && i + h < place.size()){
                    ll sum = 0;
                    for(ll y = j; y < j + w; y++){
                        sum += (ll)place[i+h][y];
                    }
                    if(sum == 0)break;
                    else if(sum != w)is = false;
                    h++;
                }
                if(i > 0)
                    for(ll y = j; y < j + w; y++){
                        if(place[i-1][y])is = false;
                    }
                if(i + h < place.size())
                    for(ll y = j; y < j + w; y++){
                        if(place[i + h][y])is = false;
                    }
                if(j > 0)
                    for(ll x = i; x < i + h; x++){
                        if(place[x][j-1])is = false;
                    }
                if(j + w < place[i].size())
                    for(ll x = i; x < i + h; x++){
                        if(place[x][j+w])is = false;
                    }
                if(is){
                    ans.insert({min(w, h), max(w, h)});
                    //cout << w << " " << h << endl;
                }
            }
        }
    }
}
void rec(vector<vector<bool>> place, vector<bool> used){
    check(place);
    //for(ll i = 0; i < place.size(); i++){for(ll j = 0; j < place[i].size(); j++)cout << place[i][j] << " ";cout << endl;}
    //for(auto i : used)cout << i << " ";cout << endl;
    for(ll i = 0; i < 3; i++){
        if(used[i])continue;
        for(ll x = 0; x < place.size(); x++){
            for(ll y = 0; y < place[x].size(); y++){
                bool is = true;
                ll w = v[i].f, h = v[i].s;
                for(ll a = 0; a < w; a++){
                    for(ll b = 0; b < h; b++){
                        if(x + a >= place.size() || y + b >= place[i].size() || !place[x+a][y + b])is = false;
                    }
                }
                bool isv = false, ish = false;
                if(is){
                    if(x > 0)

```

```

        for (ll a = 0; a < h; a++){
            if (!place[x-1][y + a]) isv = true;
        }
    else isv = true;
    if (x + w < place.size())
        for (ll a = 0; a < h; a++){
            if (!place[x+w][y + a]) isv = true;
        }
    else isv = true;

    if (y > 0)
        for (ll a = 0; a < w; a++){
            if (!place[x+a][y-1]) ish = true;
        }
    else ish = true;
    if (y + h < place[x].size())
        for (ll a = 0; a < w; a++){
            if (!place[x+a][y + h]) ish = true;
        }
    else ish = true;
    if (!ish || !isv) is = false;
}
if (is){
    vector<vector<bool>> place2 = place;
    vector<bool> used2 = used;
    for (ll a = 0; a < w; a++){
        for (ll b = 0; b < h; b++){
            place2[x+a][y + b] = false;
        }
    }
    used2[i] = true;
    rec(place2, used2);
}

is = true;
w = v[i].s, h = v[i].f;
for (ll a = 0; a < w; a++){
    for (ll b = 0; b < h; b++){
        if (x + a >= place.size() || y + b >= place[i].size() || !place[x+a][y + b]) is = false;
    }
}
}
isv = false, ish = false;
if (is){
    if (x > 0)
        for (ll a = 0; a < h; a++){
            if (!place[x-1][y + a]) isv = true;
        }
    else isv = true;
    if (x + w < place.size())
        for (ll a = 0; a < h; a++){
            if (!place[x+w][y + a]) isv = true;
        }
    else isv = true;

    if (y > 0)
        for (ll a = 0; a < w; a++){
            if (!place[x+a][y-1]) ish = true;
        }
    else ish = true;
    if (y + h < place[x].size())
        for (ll a = 0; a < w; a++){
            if (!place[x+a][y + h]) ish = true;
        }
    else ish = true;
    if (!ish || !isv) is = false;
}
if (is){
    vector<vector<bool>> place2 = place;
    vector<bool> used2 = used;
    for (ll a = 0; a < w; a++){
        for (ll b = 0; b < h; b++){
            place2[x+a][y + b] = false;
        }
    }
}

```

```

        }
        used2[i] = true;
        rec(place2, used2);
    }

}

}

}

int main() {
    //freopen("input.txt", "r", stdin);
    //freopen("output.txt", "w", stdout);
    //ios_base::sync_with_stdio(0);
    //cin.tie(0), cout.tie(0);
    v.resize(3);
    for (ll i = 0; i < 3; i++){
        ll a, b;
        cin >> a >> b;
        v[i] = {min(a, b), max(a, b)};
    }
    for (ll i = 0; i < 3; i++){
        vector <vector<bool>> place(v[i].f, vector<bool>(v[i].s, true));
        vector <bool> used(3, false);
        used[i] = true;
        rec(place, used);
    }
    for (auto i : ans) cout << i.f << " " << i.s << endl;
    return 0;
}

```

Task D ()

```
#include <bits/stdc++.h>
#define ll long long
#define f first
#define s second
#define ld long double
#define pll pair<ll, ll>
using namespace std;
pll out(ll a, ll b){
    cout << a<< " " << b << endl;
    pll g;
    cin >> g.f >> g.s;
    return g;
}
void sur(){
    cout << -1 << " " << -1 << endl;
}
int main() {
    //freopen("input.txt", "r", stdin);
    //freopen("output.txt", "w", stdout);
    //ios_base::sync_with_stdio(0);
    //cin.tie(0), cout.tie(0);
    ll n;
    cin >> n;
    vector<ll> v(n);
    for(ll i = 0; i < n; i++)cin >> v[i];
    if(n == 1){
        pll a = out(1, v[0]);
        if(a.f == -1 && a.s == -1)return 0;
        a = out(1, v[0]);
        if(a.f == -1 && a.s == -1)return 0;
    }
    return 0;
}
```

Task E ()

```

#include <bits/stdc++.h>
#define ll long long
#define f first
#define s second
#define ld long double
#define pll pair<ll, ll>
using namespace std;
vector <vector<vector<ll>>> ans(101);
void rec(ll ind, ll ch, ll sum, vector<ll> anss){
    if(ind == 10){
        ans[sum].push_back(anss);
        return;
    }
    for(ll i = ch; i <= 10; i++){
        vector<ll> ans2 = anss;
        ans2.push_back(i);
        rec(ind+1, i, sum + i, ans2);
    }
}
void create(ll i, ll j1){
    vector<vector<bool>>> mb(10, vector<bool>(10, false));
    vector<ll> v1 = ans[i][j1];
    for(ll x = 0; x < 10; x++){
        for(ll y = 0; y < v1[x]; y++){
            mb[y][x] = true;
        }
    }
    for(ll x = 0; x < 10; x++){
        for(ll y = 0; y < 10; y++){
            if(mb[x][y]) cout << "1";
            else cout << "0";
        }cout << "\n";
    }
    cout << "\n";
}
void first(ll t){
    while(t--){
        ll n;
        cin >> n;
        n--;
        ll i = 0, j1 = 0;
        while(n >= 0){
            ll mb = ans[i].size();
            if(mb <= n)n -= mb;
            else{
                j1 = n % ans[i].size();
                break;
            }
            i++;
        }
        create(i, j1);
    }
}
void s(ll t){
    while(t--){
        string s;
        vector<ll> v1(10, 0), v2(10, 0);
        ll sums = 0;
        for(ll i = 0; i < 10; i++){
            cin >> s;
            for(ll j = 0; j < 10; j++){
                if(s[j] == '1') {
                    sums++;
                    v2[i]++;
                    v1[j]++;
                }
            }
        }
        sort(v1.begin(), v1.end());
        ll j1 = 0, j2 = 0;
        for(ll i = 0; i < ans[sums].size(); i++){
            if(v1 == ans[sums][i])j1 = i;

```

```

    }
    ll n = 0;
    for (ll i = 0; i < sums; i++){
        n += ans[i].size();
    }
    n += j1;
    n++;
    cout << n << "\n";
}
}
int main() {
    //freopen("input.txt", "r", stdin);
    //freopen("output.txt", "w", stdout);
    //ios_base::sync_with_stdio(0);
    //cin.tie(0), cout.tie(0);
    rec(0, 0, 0, {});
    ll t;
    cin >> t;
    string sec;
    cin >> sec;
    if (sec == "transmit"){
        first(t);
    }
    else{
        s(t);
    }
    return 0;
}

```


Task F ()

```
a = int(input())  
b = int(input())  
print(a + b)
```