Олимпиада СПбГУ по информатике 2021/22 учебного года

A	B	C	D	E	F	Sum
100	100	100	60	58	31	449

Task A ()

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

#ifdef _WIN32
    // For alloca().
    #include <malloc.h>
#else
    #include <alloca.h>
#endif

#define ios ios_base::sync_with_stdio(0); cin.tie(0);
#define open(name1, name2) freopen(name1, "r", stdin); freopen(name2, "w", stdout);


#define HASH 31
#define MMOD 1000000009

#define INFLL 0x2aaaaaaaaaaaaaaaLL
#define INF 2000000016

#define ten9 1000000000
#define ten6 1000000+0x10

using namespace std;

typedef long long ll;
typedef vector<int> vi;
typedef vector<vi> vii;
typedef pair<int, int> pi;
typedef map<int, int> mii;


#define N 20

struct Data{
    int a;
    int b;
    friend bool operator<(const Data &a1, const Data &a2){
        if(a1.b==a2.b){
            return a1.a<a2.a;
        }
        return a1.b<a2.b;
    };
};

int main(){

    int n;
    int res = 0;
    scanf("%d", &n);

    int buffer[N];
    for(int i=0; i<N; i++){
        buffer[i]=0;
    }
```

```cpp
    int bs =0;
    int bc =0;

    int c=0;
    Data vivi[n];

    for(int i=0; i<n; i++){
        scanf("%d_%d", &vivi[i].a, &vivi[i].b);

    }

    sort(vivi, vivi+n);
    bool fl = 0;
    for(int i=0; i<n; i++){
        c = vivi[i].b;
        if(c>bc){
            int check_len = min(N, c-bc);
            int tr = 0;
            fl = 0;
            for(int j= 0; j<check_len; j++){
                if(buffer[(bs+j)%N]!=0){
                    fl = 1;
                    break;
                }
                else{
                    tr++;
                }
            }

            if(fl){
                res += tr;
                break;
            }
            else{
                res += c-bc;
                bs = (bs + c-bc)%N;
                bc = c;
            }
        }

        int f = vivi[i].a;
        int cc = 0;
        while(f!=0){
            int cur = (cc+bs)%N;
            buffer[cur]+=f%10;
            while(buffer[cur]>9){
                buffer[cur]=buffer[cur]%10;
                cur++; cur%=N;
                buffer[cur]++;
            }
            f/=10;
            cc++;
        }
    }
    if(fl==0){
        int tr = 0;
        for(int j= 0; j<N; j++){
            if(buffer[(bs+j)%N]!=0){
                break;
            }
            else{
                tr++;
            }
        }
        res += tr;
    }

    printf("%d\n", res);

}
```

Task B ()

```c
#define _CRT_SECURE_NO_WARNINGS
#include <stdio.h>
#include <bits/stdc++.h>

#ifdef _WIN32
    // For alloca().
    #include <malloc.h>
#else
    #include <alloca.h>
#endif

#define ios ios_base::sync_with_stdio(0); cin.tie(0);
#define open(name1, name2) freopen(name1, "r", stdin); freopen(name2, "w", stdout);


#define HASH 31
#define MMOD 1000000009

#define INFLL 0x2aaaaaaaaaaaaaaaLL
#define INF 2000000016

#define ten9 1000000000
#define ten6 1000000+0x10

using namespace std;

typedef long long ll;
typedef vector<int> vi;
typedef vector<vi> vii;
typedef pair<int, int> pi;
typedef map<int, int> mii;

char st[1000];
int get_r(){

    scanf("%s", st);
    return (strlen(st)-3)/2;
};

int cmd_r(int com){
    int res =-1;

    switch (com)
    {
    case 1:
        printf("Wait\n");
        break;
    case 2:
        printf("Flip_and_wait\n");
        break;
    case 3:
        printf("Stop\n");
        break;

    }
    fflush(stdout);

    if(com<3){
        res = get_r();
    }
    else{
        exit(0);
    }

    return res;
}


int main(){
    int n;
    scanf("%d", &n);
```

```c
    int k[n];
    for(int i=0; i<n; i++)
        scanf("%d", &k[i]);

    for(int i=0; i<n; i++){
        //int s = 0;
        while (k[i]/2>0)
        {
//              printf("[fir]: i = %d | k[i] = %d\n", i, k[i]);

            int prev=i+1;

            for(int l =0; l<2; l++){
                int res=0;
                res += cmd_r(2);

                while(res<prev){
                    res += cmd_r(1);
                }
            }
            k[i]-=2;
        }


    }


    for(int i=n-1; i>=0; i--){
        //int s = 0;
        while (k[i]>0)
        {
//          printf("[sec]: i = %d | k[i] = %d\n", i, k[i]);
            int prev=i+1;
            int res=0;

            res += cmd_r(2);

            while(res<prev){
                res += cmd_r(1);
            }
            k[i]--;
        }


    }

    cmd_r(3);
}
```

Task C ()

```c
#define _CRT_SECURE_NO_WARNINGS
#include <stdio.h>
#include <bits/stdc++.h>

#ifdef _WIN32
    // For alloca().
    #include <malloc.h>
#else
    #include <alloca.h>
#endif

#define ios ios_base::sync_with_stdio(0); cin.tie(0);
#define open(name1, name2) freopen(name1, "r", stdin); freopen(name2, "w", stdout);


#define HASH 31
#define MMOD 1000000009

#define INFLL 0x2aaaaaaaaaaaaaaaLL
#define INF 2000000016

#define ten9 1000000000
#define ten6 1000000+0x10

using namespace std;

typedef long long ll;
typedef vector<int> vi;
typedef vector<vi> vii;
typedef pair<int, int> pi;
typedef map<int, int> mii;

char st[200100];

void work(int n){
    for(int i=0; i<n/2; i++){
        int cur = i*2;
        if((st[cur]=='?')||(st[cur+1]=='?')){
            if(st[cur]=='?'){
                st[cur]=st[cur+1];
            }
            else{
                st[cur+1]=st[cur]^1;
            }
        }
        else
        {
            if(st[cur]==st[cur+1]){
                st[cur]='?';
            }
            else{
                st[cur+1]='?';
            }
        }
    }
};

int main(){
    int t;
    scanf("%d", &t);
    while(t--){
        scanf("%s", st);
        int n = strlen(st);
        work(n);
        printf("%s\n", st);
    }
}
```

Task D ()

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

#ifdef _WIN32
    // For alloca().
    #include <malloc.h>
#else
    #include <alloca.h>
#endif

#define ios ios_base::sync_with_stdio(0); cin.tie(0);
#define open(name1, name2) freopen(name1, "r", stdin); freopen(name2, "w", stdout);


#define HASH 31
#define MMOD 1000000009

#define INFLL 0x2aaaaaaaaaaaaaaaLL
#define INF 2000000016

#define ten9 1000000000
#define ten6 1000000+0x10

using namespace std;

typedef long long ll;
typedef vector<int> vi;
typedef vector<vi> vii;
typedef pair<int, int> pi;
typedef map<int, int> mii;



#define MOD 998244353



int main(){

    int n;
    scanf("%d", &n);

    //ll pres2 =0;
    int pres =1;
    int res = 2;
    //ll cur = 1;
    //ll prev= 0;
    int zeroes = 0;

    for(int i=2; i<=n; ++i){
        int buf = (1LL*pres*((1LL*i*i)%MOD))%MOD;
        pres = res;
        res+= buf;
        while((res>0)&&(res%MOD==0)){
            ++zeroes;
            res/=MOD;
        }
        res%=MOD;
        /* if(res<0){
            printf("res = %lld, pres = %lld, i = %d", res, pres, i);
            break;
        }*/
        //prev = cur;
        //cur = buf;
    }


    printf("%d_%d\n", zeroes, res);
```

}

Task E ()

```
#define _CRT_SECURE_NO_WARNINGS
#include <stdio.h>
#include <bits/stdc++.h>

#ifdef _WIN32
    // For alloca().
    #include <malloc.h>
#else
    #include <alloca.h>
#endif

#define ios ios_base::sync_with_stdio(0); cin.tie(0);
#define open(name1, name2) freopen(name1, "r", stdin); freopen(name2, "w", stdout);


#define HASH 31
#define MMOD 1000000009

#define INFLL 0x2aaaaaaaaaaaaaaaLL
#define INF 2000000016

#define ten9 1000000000
#define ten6 1000000+0x10

using namespace std;

typedef long long ll;
typedef vector<int> vi;
typedef vector<vi> vii;
typedef pair<int, int> pi;
typedef map<int, int> mii;

struct Data{
    int l;
    int r;
    int val;
    friend bool operator<(const Data &a1, const Data &a2){
        return a1.r<a2.r;
    }
};

struct Hh{
    ll delta;
    int num;
/*
    friend bool operator<(const Hh &a1, const Hh &a2){
        return a1.delta<a2.delta;
    };*/
};


int main(){
    int n;
    scanf("%d", &n);
    int v[n];

    for(int i=0; i<n; ++i){
        scanf("%d", &v[i]);
    }




    int q;
    scanf("%d", &q);
/*    int bs = sqrt(q);
    int ss = q/bs+1;
    vector<Data> moo[ss];
*/
    for(int i=0; i<q; ++i){
        ll res = 0;
```

8

```
        int l, r, val;
        scanf("%d %d %d", &l, &r, &val);

        while(l<r){
            int m = val/v[l];
            if(m*v[l]!=val)
                m++;

            res+=m;
            l++;
            //printf("[%d]:%lld\n",l,  res);
        }
        printf("%lld\n", res);
    }
/*
    for(int i=0; i<ss; ++i)
        sort(moo[i].begin(), moo[i].end());
 */


}
```

Task F ()

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

#ifdef _WIN32
    // For alloca().
    #include <malloc.h>
#else
    #include <alloca.h>
#endif

#define ios ios_base::sync_with_stdio(0); cin.tie(0);
#define open(name1, name2) freopen(name1, "r", stdin); freopen(name2, "w", stdout);


#define HASH 31
#define MMOD 1000000009

#define INFLL 0x2aaaaaaaaaaaaaaaLL
#define INF 2000000016

#define ten9 1000000000
#define ten6 1000000+0x10

using namespace std;

typedef long long ll;
typedef vector<int> vi;
typedef vector<vi> vii;
typedef pair<int, int> pi;
typedef map<int, int> mii;

pi *v;

int *dp;
int n;

void work(int a){
    //printf("]: %d\n", a);
    ll l=0;
    ll r=0;
    int res =1;
    for(int i=a; i<n; i++){
        l+=v[i].first;
        r+=v[i].second;

        if((l<=0)&&(0<=r)){
            res = max(res, dp[i+1]+1);
        }
    }
    dp[a]=res;
}

int main(){
    int res = 0;
    scanf("%d", &n);

    v= new pi[n];
    dp = new int[n+1];

    for(int i=0; i<n; ++i){
        scanf("%d_%d", &v[i].first, &v[i].second);
    }

    for(int i=n; i>=0; i--){
        work(i);
        res = max(res, dp[i]);
    }


    printf("%d\n", res);
```

}