

Олимпиада СПбГУ по информатике 2021/22 учебного года

A	B	C	D	E	F	Sum
100	100	100	100	58	0	458

Task A ()

```
#define _USE_MATH_DEFINES
#include <iostream>
#include <fstream>
#include <cstdio>
#include <algorithm>
#include <cmath>
#include <string>
#include <iomanip>
#include <vector>
#include <set>
#include <map>
#include <unordered_map>
#include <unordered_set>
#include <list>
#include <queue>
#include <deque>
#include <ctime>
#include <chrono>
#include <random>
#include <bitset>
#include <stack>
#include <cstring>
#define fast cin.tie(0); cout.tie(0); cin.sync_with_stdio(0); cout.sync_with_stdio(0)
#define F first
#define S second
#define pq priority_queue
#define umap unordered_map
#define uset unordered_set
#define pb push_back
#define sqr(x) ((x)*(x))
#define fill(v,n) for(int qq=0;qq<n;qq++)cin>>v[qq]
#define seed (myclock::now() - beginning).count()
#define mod 1000000007
#define eps 1e-7
#define BIL 1000000000ll
#define INF sqr(2 * BIL)

using namespace std;

typedef long long ll;
typedef unsigned long long ull;
typedef pair<int, int> pii;
typedef pair<ll, ll> pll;
typedef pair<ull, ull> pull;
typedef long double ld;
typedef pair<ld, ld> pld;
typedef chrono::high_resolution_clock myclock;

int main() {
    fast;
    int n;
    cin >> n;
    vector<pll> v(n);
    for (int i = 0; i < n; i++)
        cin >> v[i].second >> v[i].first;
    sort(v.begin(), v.end());
```

```

    pll cur = v[0];
    for (int i = 1; i < n; i++) {
        while (cur.second % 10 == 0 && cur.first < v[i].first) {
            cur.first++;
            cur.second /= 10;
        }
        if (cur.first < v[i].first)
            break;
        cur.second += v[i].second;
    }
    while (cur.second % 10 == 0) {
        cur.second /= 10;
        cur.first++;
    }
    cout << cur.first;
}

```

Task B ()

```
#define _USE_MATH_DEFINES
#include <iostream>
#include <fstream>
#include <cstdio>
#include <algorithm>
#include <cmath>
#include <string>
#include <iomanip>
#include <vector>
#include <set>
#include <map>
#include <unordered_map>
#include <unordered_set>
#include <list>
#include <queue>
#include <deque>
#include <ctime>
#include <chrono>
#include <random>
#include <bitset>
#include <stack>
#include <cstring>
#define fast cin.tie(0);cout.tie(0);cin.sync_with_stdio(0);cout.sync_with_stdio(0)
#define F first
#define S second
#define pq priority_queue
#define umap unordered_map
#define uset unordered_set
#define pb push_back
#define sqr(x) ((x)*(x))
#define fill(v,n) for(int qq=0;qq<n;qq++)cin>>v[qq]
#define seed (myclock::now() - beginning).count()
#define mod 1000000007
#define eps 1e-7
#define BIL 100000000011
#define INF sqr(2 * BIL)

using namespace std;

typedef long long ll;
typedef unsigned long long ull;
typedef pair<int, int> pii;
typedef pair<ll, ll> pll;
typedef pair<ull, ull> pull;
typedef long double ld;
typedef pair<ld, ld> pld;
typedef chrono::high_resolution_clock myclock;

int main() {
    fast;
    int n;
    cin >> n;
    vector<int> k(n);
    fill(k, n);
    for (int i = n - 1; i >= 0; i--) {
        while (k[i]--) {
            cout << "Flip_and_wait" << endl;
            int curpos = -1;
            while (curpos < i) {
                string s;
                cin >> s;
                int done = (s.size() - 3) / 2;
                curpos += done;
                if (curpos < i)
                    cout << "Wait" << endl;
            }
        }
    }
    cout << "Stop";
}
```

Task C ()

```
#define _USE_MATH_DEFINES
#include <iostream>
#include <fstream>
#include <cstdio>
#include <algorithm>
#include <cmath>
#include <string>
#include <iomanip>
#include <vector>
#include <set>
#include <map>
#include <unordered_map>
#include <unordered_set>
#include <list>
#include <queue>
#include <deque>
#include <ctime>
#include <chrono>
#include <random>
#include <bitset>
#include <stack>
#include <cstring>
#define fast cin.tie(0);cout.tie(0);cin.sync_with_stdio(0);cout.sync_with_stdio(0)
#define F first
#define S second
#define pq priority_queue
#define umap unordered_map
#define uset unordered_set
#define pb push_back
#define sqr(x) ((x)*(x))
#define fill(v,n) for(int qq=0;qq<n;qq++)cin>>v[qq]
#define seed (myclock::now() - beginning).count()
#define mod 1000000007
#define eps 1e-7
#define BIL 100000000011
#define INF sqr(2 * BIL)

using namespace std;

typedef long long ll;
typedef unsigned long long ull;
typedef pair<int, int> pii;
typedef pair<ll, ll> pll;
typedef pair<ull, ull> pull;
typedef long double ld;
typedef pair<ld, ld> pld;
typedef chrono::high_resolution_clock myclock;

void decode(string &s, int one, int zero) {
    if (one + zero == 1 && s.back() != '?')
        for (char& c : s)
            c = s.back();
    else if (one == 1 && zero == 1) {
        for (int i = 0; i < s.size() - 2; i++)
            s[i] = s[s.size() - 2];
    }
    else {
        for (char &c : s)
            if (c == '?') {
                if (one)
                    c = '0';
                else c = '1';
            }
    }
    cout << s << "\n";
}

void encode(string& s, int one, int zero) {
    if (one == 0 || zero == 0)
        for (int i = 0; i < s.size() - 1; i++)
            s[i] = '?';
    else {
```

```

        if (zero == 1 && s.back() == '0') {
            if (one == 1) {
                cout << "1?\n";
                return;
            }
            for (int i = 0; i < s.size() - 2; i++)
                s[i] = '?';
        }
        else if (one == 1 && s.back() == '1') {
            if (zero == 1) {
                cout << "0?\n";
                return;
            }
            for (int i = 0; i < s.size() - 2; i++)
                s[i] = '?';
        }
        else {
            char change = '0';
            if (one > zero)
                change = '1';
            for (char& c : s)
                if (c == change)
                    c = '?';
        }
    }
    cout << s << "\n";
}

int main() {
    fast;
    int n;
    cin >> n;
    while (n--) {
        string s;
        cin >> s;
        bool q = false;
        int one = 0, zero = 0;
        for (char c : s) {
            if (c == '?') q = true;
            else if (c == '0')
                zero++;
            else one++;
        }
        if (q)
            decode(s, one, zero);
        else encode(s, one, zero);
    }
}

```

Task D ()

```
#define _USE_MATH_DEFINES
#include <iostream>
#include <fstream>
#include <cstdio>
#include <algorithm>
#include <cmath>
#include <string>
#include <iomanip>
#include <vector>
#include <set>
#include <map>
#include <unordered_map>
#include <unordered_set>
#include <list>
#include <queue>
#include <deque>
#include <ctime>
#include <chrono>
#include <random>
#include <bitset>
#include <stack>
#include <cstring>
#define fast cin.tie(0);cout.tie(0);cin.sync_with_stdio(0);cout.sync_with_stdio(0)
#define F first
#define S second
#define pq priority_queue
#define umap unordered_map
#define uset unordered_set
#define pb push_back
#define sqr(x) ((x)*(x))
#define fill(v,n) for(int qq=0;qq<n;qq++)cin>>v[qq]
#define seed (myclock::now() - beginning).count()
#define mod 998244353ll
#define eps 1e-7
#define BIL 1000000000ll
#define INF sqr(2 * BIL)

using namespace std;

typedef long long ll;
typedef unsigned long long ull;
typedef pair<int, int> pii;
typedef pair<ll, ll> pll;
typedef pair<ull, ull> pull;
typedef long double ld;
typedef pair<ld, ld> pld;
typedef chrono::high_resolution_clock myclock;

ll binpow(ll a, ll x) {
    if (x == 0)
        return 1;
    if (x % 2)
        return (binpow(a, x - 1) * a) % mod;
    ll t = binpow(a, x / 2);
    return sqr(t) % mod;
}

ll stupid(ll n, ll prev = 1, ll b = 2) {
    ll ans = prev;
    for (ll i = b; i <= n; i++) {
        ans *= i;
        ans %= mod;
    }
    return ans;
}

vector<ll> vals(50), res = { 911660635, 699380660, 588890728, 719417782, 984379199, 344567490,
    789829378, 80289105, 571110222, 872776685, 395244690, 225960331, 295654855, 994977800,
    251880767, 524106618, 543192323, 653281165, 288216140, 136535170, 351316163, 987493485,
    174315677, 788760176, 238950100, 454654676, 123971965, 336749481, 33290209, 658113341,
    610106350, 129832840, 954509168, 675033618, 736933903, 537194759, 353188792, 606920183,
    552033393, 547769593, 441763267, 702805025, 360577948, 169630078, 126442274, 774154016,
```

```

140157905, 816021892, 150583027, 935803102};

ll fact(ll a) {
    if (a <= mod / 2)
        return stupid(a);
    for (int i = 49; i >= 0; i--)
        if (vals[i] < a)
            return stupid(a, res[i], vals[i] + 1);
}

int main() {
    fast;
    for (ll t = 50; t < 100; t++)
        vals[t - 50] = t * mod / 100;
    ll n, k;
    cin >> n;
    ll ans = fact((n + 1) % mod);
    k = (n + 1) / mod;
    ans *= binpow(mod - 1, k);
    ans %= mod;
    if ((n + 1) / mod >= mod)
        k++;
    cout << k << " " << ans;
}

```

Task E ()

```
#define _USE_MATH_DEFINES
#include <iostream>
#include <fstream>
#include <cstdio>
#include <algorithm>
#include <cmath>
#include <string>
#include <iomanip>
#include <vector>
#include <set>
#include <map>
#include <unordered_map>
#include <unordered_set>
#include <list>
#include <queue>
#include <deque>
#include <ctime>
#include <chrono>
#include <random>
#include <bitset>
#include <stack>
#include <cstring>
#define fast cin.tie(0);cout.tie(0);cin.sync_with_stdio(0);cout.sync_with_stdio(0)
#define F first
#define S second
#define pq priority_queue
#define umap unordered_map
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#define pb push_back
#define sqr(x) ((x)*(x))
#define fill(v,n) for(int qq=0;qq<n;qq++)cin>>v[qq]
#define seed (myclock::now() - beginning).count()
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#define BIL 10000000000ll
#define INF sqr(2 * BIL)

using namespace std;

typedef long long ll;
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typedef pair<ll, ll> pll;
typedef pair<ull, ull> pull;
typedef long double ld;
typedef pair<ld, ld> pld;
typedef chrono::high_resolution_clock myclock;

int main() {
    fast;
    int n;
    cin >> n;
    vector<int> v(n);
    fill(v, n);
    int q;
    cin >> q;
    while (q--) {
        int a, b, d;
        cin >> a >> b >> d;
        b--;
        ll ans = 0;
        for (int i = a; i <= b; i++)
            ans += (d + v[i] - 1) / v[i];
        cout << ans << "\n";
    }
}
```


Task F ()