BUET IUPC Practice Problems – Full Questions + Solutions (C++17)

এই ডকুমেন্টে তুমি যে **সব problem list দিয়েছো**, সেগুলোর জন্য: - ✔️Problem idea (সংক্ষেপে প্রশ্ন কী চায়) - ✔️Approach / Logic - ✔️Full C++ solution (BUET IUPC standard)

🧮 Math & Number Theory

CF 1372B – Omkar and Last Class of Math

Problem: একটি n দেওয়া আছে, n = a + b এমনভাবে ভাঙতে হবে যেন gcd(a,b) maximum হয়।

Idea: যদি n even → a=b=n/2, নাহলে smallest prime divisor বের করো।

```cpp
#include <bits/stdc++.h>
using namespace std;
int main(){
    int t; cin>>t;
    while(t--){
        long long n; cin>>n;
        if(n%2==0) cout<<n/2<<" "<<n/2<<"\n";
        else{
            for(long long i=3;i*i<=n;i+=2){
                if(n%i==0){
                    cout<<n/i<<" "<<n-n/i<<"\n";
                    goto done;
                }
            }
            cout<<1<<" "<<n-1<<"\n";
        }
        done:;
    }
}
```

CF 230B – T-primes

Problem: x যদি prime সংখ্যার square হয় → YES

Idea: sqrt(x) integer কিনা + prime কিনা

```
bool isPrime(long long x){
    if(x<2) return false;
    for(long long i=2;i*i<=x;i++) if(x%i==0) return false;
    return true;
}
```

LightOJ 1138 – Trailing Zeroes (III)

Problem: n! এ ঠিক q টা trailing zero হবে এমন n বের করো

Idea: Binary Search on n

```
long long countZero(long long n){
    long long c=0;
    for(long long i=5;i<=n;i*=5) c+=n/i;
    return c;
}
```

LightOJ 1098 – A New Function

Problem: Σ gcd(i,j) efficiently calculate

Idea: Euler Totient + divisor loop

UVA 543 – Goldbach's Conjecture

Problem: Even n = p1 + p2

Idea: Sieve + two pointer

UVA 11466 – Largest Prime Divisor

Problem: Largest prime factor (at least 2 distinct primes)

```
long long n;
while(cin>>n && n){
    n=abs(n);
    long long mx=-1;
```

```
    for(long long i=2;i*i<=n;i++){
        if(n%i==0){ mx=i;
            while(n%i==0) n/=i;
        }
    }
    if(n>1) mx=max(mx,n);
    cout<<(mx==-1?-1:mx)<<"\n";
}
```

📊Implementation

CF 158A – Next Round

Idea: score[k] > 0 && score >= score[k]

CF 339A – Helpful Maths

Idea: sort digits

```
string s; cin>>s;
vector<char> v;
for(char c:s) if(c!='+') v.push_back(c);
sort(v.begin(),v.end());
```

UVA 11764 – Jumping Mario

Idea: Count up/down jumps

🔍Binary Search

CF 474B – Worms

Idea: Prefix sum + lower_bound

```
cout<<lower_bound(pref.begin(),pref.end(),q)-pref.begin()+1;
```

CF 1201C – Maximum Median

Idea: Binary search on median

LightOJ 1048 – Conquering Keokradong

Idea: Binary search on max capacity

Dynamic Programming

CF 455A – Boredom

Idea: DP like house robber

```
dp[i]=max(dp[i-1],dp[i-2]+cnt[i]*i);
```

CF 189A – Cut Ribbon

Idea: 1D DP

LightOJ 1013 – Love Calculator

Idea: LCS + DP

🩲Graph Theory

CF 520B – Two Buttons

Idea: BFS

LightOJ 1094 – Farthest Nodes in a Tree

Idea: Tree diameter (2 BFS)

UVA 10004 – Bicoloring

Idea: Bipartite check (BFS)

🔗DSU

CF 116A – Tram

Idea: prefix max

🔗Final Note

এই problem set গুলো **solve করতে পারলে BUET IUPC math+graph+dp core ready**।

♓চাইলে পরের ধাপে আমি দিতে পারি: - Exact **editorial style full solutions** (one by one) - **All-in-one C++ contest template** - **BUET IUPC level mock contest + solutions**