Number of primes: C++

```cpp
#include <bits/stdc++.h>
// #define ll long long
using namespace std;
#define ma 10000001
bool a[ma];

int main()
{
int n;
cin>>n;
for(int i=0;i<=n;i++){
    a[i]=false;
}
for(int i=2;i<=n;i++){
    if(a[i]==false){
        for(int j=i+i;j<=n;j+=i){
            a[j]=true;
        }
    }
}
int cnt=0;
for(int i=2;i<=n;i++){
    if(a[i]==false){cnt++;}
}
cout<<cnt;
    return 0;
}
```

Divisors Of N: C++

```cpp
#include <bits/stdc++.h>
using namespace std;
int main(){



int t;
cin>>t;
while(t--){
    long long n;
    cin>>n;
    if(n&1){cout<<0<<endl;continue;}
    long x=sqrt(n);
    int cnt=0;
```

```cpp
    for(long long i=1;i<=x;i++){
        if(!(n%i)){
            if(!(i%2)){cnt++;}
            if(i*i!=n){
                if(!((n/i)%2)){cnt++;}
            }
        }

    }
    cout<<cnt<<endl;}
}
```

Chocolaty Problem: C++

```cpp
#include <bits/stdc++.h>
// #define ll long long
using namespace std;
int main(){
long long x,n;
cin>>n;
for(int i=n;i<n+500;i++){
    x=i;
    long long p=sqrt(x);
    for(int j=2;j<=p;j++){
        if(x%j==0){goto f;}
    }
    cout<<i-n;
    return 0;
    f:;
}

}
```

sprime : C++

```cpp
#include <bits/stdc++.h>
using namespace std;
#define max1 10000001
bool a[max1];
    long b[max1];

void pre(){
    b[0]=0;b[1]=0;
 for(int i=0;i<max1;i++){
        a[i]=false;
```

```
    }
    long cnt=0;
    for(int i=2;i<max1;i++){
    if(a[i]==false){
        cnt++;
        for(int j=i+i;j<=max1;j=j+i){a[j]=true;}
    }
    b[i]=cnt;
    }

    }
int main(){
pre();
int t;
cin>>t;
while(t--){
    long n;
    cin>>n;

    cout<<(b[n]-b[(n)/2])<<endl;
}
}
```

Simple Prime (Contest) : C++

```
#include "bits/stdc++.h"
#pragma GCC optimize "03"
using namespace std;

#define int long long int
#define ld long double
#define pi pair<int, int>
#define pb push_back
#define fi first
#define se second
#define IOS ios::sync_with_stdio(false); cin.tie(0); cout.tie(0)
#ifndef LOCAL
#define endl '\n'
#endif

const int N = 1e6 + 5;
const int mod = 1e9 + 7;
const int inf = 1e9 + 9;

int a[N];
```

```cpp
signed main() {
    IOS;
    vector<int> v;
    v.push_back(0);
    for(int i = 2; i < N; i++){
        if(a[i])     continue;
        v.push_back(i);
        for(int j = i*i; j < N; j += i)
            a[j] = 1;
    }
    int p = 0;
    for(auto &i: v){
        i += p;
        p = i;
    }
    int t; cin >> t;
    while(t--){
        int l, r;
        cin >> l >> r;
        cout << v[r] - v[l-1] << endl;
    }
    return 0;
}
```

Tribonacci Number: Java

```java
import java.io.*;
import java.util.*;
class Main
 {
    static int mod = 1000000007;

    public static void main(String[] args)throws IOException {
        BufferedReader read = new BufferedReader(new
InputStreamReader(System.in));
    //int t = Integer.parseInt(read.readLine());


        String str[] = read.readLine().trim().split(" ");
            int n = Integer.parseInt(str[0]);
            long a  =Long.parseLong(str[1]);
            long b = Long.parseLong(str[2]);
            long c = Long.parseLong(str[3]);
```

```java
            long dp[] = new long[n];
            dp[0] = a;
            dp[1] = b;
            dp[2] = c;

            for(int i = 3; i < n; i++)
            {
                dp[i] = (dp[i-1]%mod + dp[i-2]%mod + dp[i-3]%mod)%mod;
            }

        System.out.println(dp[n-1]);
    }

}
```

Catalan Numbers : C++

```cpp
#include<bits/stdc++.h>
#define int        long long
#define ld         long double
#define ll         long long
#define pb          push_back
#define endl        '\n'
#define pi          pair<int,int>
#define vi          vector<int>
#define all(a)      (a).begin(),(a).end()
#define fi          first
#define se          second
#define sz(x)       (int)x.size()
#define hell        1000000007
#define rep(i,a,b)  for(int i=a;i<b;i++)
#define dep(i,a,b)  for(int i=a;i>=b;i--)
#define lbnd        lower_bound
#define ubnd         upper_bound
#define bs          binary_search
#define mp          make_pair
using namespace std;

const int N = 2e6 + 5;
const int mod = 1e9 + 7;
const int inf = 1e9 + 9;

int f[N], inv[N], res[N];

int power(int a, int b){
```

```cpp
    int ans = 1;
    while(b){
        if(b&1)
            ans = (ans*a) % mod;
        b >>= 1;
        a = (a*a) % mod;
    }
    return ans;
}

void solve(){
    int n;  cin >> n;
    cout << res[n] << endl;
}

void testcases(){
    int tt = 1;
    f[0] = 1;
    for(int i = 1; i < N; i++)
        f[i] = (i*f[i-1]) % mod;
    inv[N-1] = power(f[N-1], mod-2);
    for(int i = N-2; i >= 1; i--)
        inv[i] = ((i+1)*inv[i+1]) % mod;
    for(int i = 1; i < N/2; i++){
        res[i] = f[2*i];
        res[i] = (res[i]*inv[i]) % mod;
        res[i] = (res[i]*inv[i]) % mod;
        res[i] = (res[i]*power(i+1, mod-2)) % mod;
    }
    cin >> tt;
    while(tt--){
        solve();
    }
}


signed main()
{
    ios_base::sync_with_stdio(false);
    cin.tie(0);
    cout.tie(0);

            clock_t start = clock();


    testcases();
```

```cpp
            cerr << (double)(clock() - start)*1000/CLOCKS_PER_SEC << " ms: ";
    return 0;
}
```

Candy ways (Contest): C++

```cpp
#pragma GCC optimize ("Ofast")
#include<bits/stdc++.h>
using namespace std;
#define ll long long
#define VV vector
#define pb push_back
#define bitc  __builtin_popcountll
#define m_p make_pair
#define infi 1e18+1
#define eps 0.000000000001
#define fastio ios_base::sync_with_stdio(false);cin.tie(NULL);
string char_to_str(char c){string tem(1,c);return tem;}
mt19937 rng(chrono::steady_clock::now().time_since_epoch().count());
template<class T>//usage rand<long long>()
T rand() {
    return uniform_int_distribution<T>()(rng);
}
#include <ext/pb_ds/assoc_container.hpp>
#include <ext/pb_ds/tree_policy.hpp>
using namespace __gnu_pbds;

template<class T>
using oset = tree<T, null_type, less<T>, rb_tree_tag,
tree_order_statistics_node_update>;
// string to integer stoi()
// string to long long stoll()
// string.substr(position,length);
// integer to string to_string();

///////////////
auto clk=clock();
#define all(x) x.begin(),x.end()
#define S second
#define F first
#define sz(x) ((long long)x.size())
// #define int long long
#define f80 __float128
#define pii pair<int,int>
```

```cpp
#define rep(i, n) for(int i = 0; i < (int)(n); i++)
/////////////

const int MOD=1e9+7;
int modpow(ll a, ll n) {
  if(n==0) return 1;
  if(n==1) return a%MOD;
  if(n%2==1) return (a*modpow(a,n-1))%MOD;
  ll t = modpow(a,n/2);
  return (t*t)%MOD;
}

int modcmb(ll l, ll r) {
  ll x=1,y=1;
  rep(i,r) {
    x=(x*(l-i))%MOD;
    y=(y*(i+1))%MOD;
  }
  return (x*modpow(y,MOD-2))%MOD;
}

int main() {
      #ifdef ANIKET_GOYAL
            freopen("inputf.in","r",stdin);
            freopen("outputf.in","w",stdout);
      #endif
  int n,a,b;
  cin>>n>>a>>b;
  int ans=modpow(2,n)-1;
  int c=modcmb(n,a);
  int d=modcmb(n,b);
  ans=(ans-c+MOD)%MOD;
  ans=(ans-d+MOD)%MOD;
  cout<<ans;
}
```

Deadly Exponentiation (Simple Contest) : C++

```cpp
#include <bits/stdc++.h>
using namespace std;
#define sd(x) scanf("%d", &x)
#define sz(v) (int) v.size()
#define pr(v) For(i, 0, sz(v)) {cout<<v[i]<<" ";} cout<<endl;
#define slld(x) scanf("%lld", &x)
#define all(x) x.begin(), x.end()
#define For(i, st, en) for(ll i=st; i<en; i++)
#define tr(x) for(auto it=x.begin(); it!=x.end(); it++)
```

```cpp
#define fast std::ios::sync_with_stdio(false);cin.tie(NULL);
#define pb push_back
#define ll long long
#define ld long double
#define int long long
#define double long double
#define mp make_pair
#define F first
#define S second
typedef pair<int, int> pii;
typedef vector<int> vi;
#define pi 3.141592653589793238
const int MOD = 1e9+7;
const int INF = 1LL<<60;


const int N = 2e5+5;

// it's swapnil07 ;)

#ifdef SWAPNIL07
#define trace(...) __f(#__VA_ARGS__, __VA_ARGS__)
template <typename Arg1>
void __f(const char* name, Arg1&& arg1){
    cout << name << " : " << arg1 << endl;
}
template <typename Arg1, typename... Args>
void __f(const char* names, Arg1&& arg1, Args&&... args){
    const char* comma = strchr(names + 1, ',');cout.write(names, comma -
names) << " : " << arg1<<" | ";__f(comma+1, args...);
}
int begtime = clock();
#define end_routine() cout << "\n\nTime elapsed: " << (clock() -
begtime)*1000/CLOCKS_PER_SEC << " ms\n\n";
#else
#define endl '\n'
#define trace(...)
#define end_routine()
#endif


int powmod(int a, int b, int c = MOD){
    int ans = 1;
    while(b){
        if(b&1){
            ans = (ans*a)%c;
        }
```

```cpp
        a = (a*a)%c;
        b >>= 1;
    }
    return ans;
}

void solve(){
    int a, b, c, d; cin>>a>>b>>c>>d;
    int x = pow(c, d);
    int y = powmod(b, x, MOD-1);
    int ans = powmod(a, y, MOD);
    cout<<ans;
}


signed main()
{
    fast
    #ifdef SWAPNIL07
        freopen("input.txt","r",stdin);
        freopen("output.txt","w",stdout);
    #endif
    int t=1;
    // cin>>t;
    while(t--){
        solve();
        cout<<"\n";
    }
    return 0;
}
```

Is this prime? : C++

```cpp
#include "bits/stdc++.h"
#pragma GCC optimize "03"
using namespace std;

#define int long long int
#define ld long double
#define pi pair<int, int>
#define pb push_back
#define fi first
#define se second
#define IOS ios::sync_with_stdio(false); cin.tie(0); cout.tie(0)
#ifndef LOCAL
#define endl '\n'
#endif
```

```cpp
const int N = 2e5 + 5;
const int mod = 1e9 + 7;
const int inf = 1e9 + 9;

int power(int a, int b){
    int ans = 1;
    b %= (mod-1);
    while(b){
        if(b&1)
            ans = (ans*a) % mod;
        b >>= 1;
        a = (a*a) % mod;
    }
    return ans;
}

int f(int n, int p){
    int ans = 1;
    int cur = 1;
    while(cur <= n/p){
        cur = cur*p;
        int z = power(p, n/cur);
        ans = (ans*z) % mod;
    }
    return ans;
}

signed main() {
    IOS;
    int x, n, ans = 1;
    cin >> x >> n;
    for(int i = 2; i*i <= x; i++){
        if(x%i != 0)    continue;
        ans = (ans*f(n, i)) % mod;
        while(x%i == 0)
            x /= i;
    }
    if(x > 1)
        ans = (ans*f(n, x)) % mod;
    cout << ans;
    return 0;
}
```

Super-Exponentation: C++

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

```cpp
using namespace std;
#define mem(a, b) memset(a, (b), sizeof(a))
#define fore(i,a) for(int i=0;i<a;i++)
#define fore1(i,j,a) for(int i=j;i<a;i++)
#define print(ar) for(int i=0;i<ar.size();i++)cout<<ar[i]<<" ";
#define END cout<<'\n'
const double pi=acos(-1.0);

typedef pair<int, int> PII;

typedef vector<long long> VI;

typedef vector<string> VS;

typedef vector<PII> VII;

typedef vector<VI> VVI;

typedef map<int,int> MPII;

typedef set<int> SETI;

typedef multiset<int> MSETI;

typedef long int li;

typedef unsigned long int uli;

typedef long long int ll;

typedef unsigned long long int  ull;
ll fastexp (ll a, ll b, ll n) {
  ll res = 1;
  while (b) {
     if (b & 1) res = res*a%n;
     a = a*a%n;
     b >>= 1;
  }
  return res;
}
void fast(){
ios::sync_with_stdio(0);
cin.tie(0);
cout.tie(0);
}
int main()
 {
```

```cpp
    fast();
 ll a,b,c;
        int t, n, k;
        cin >> t;
        while(t--) {
            cin >> a >>b >>c;
    ll mod = 1e9+7;
    ll k = fastexp(b,c,mod-1);
    ll ans= fastexp(a,k,mod);
cout<<ans<<endl;

        }}
```