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## 【没选修实验课的同学专用的编程题】

使用C/C++实现整数的指数运算：即给定a、x和N，求a的x次方mod N。可参看教科书的算法。也可参考我今天上课讲的那段乘法。

```
#include <algorithm>
#include <bits/stdc++.h>
#include <cstdio>
#include <cstring>
#include <iostream>

using namespace std;
typedef long long ll;

const int INF = 0x7f7f7f7f;
const int maxn = 100 + 10;

ll phi ( ll n ) { //返回euler(n)
    ll res = n, a = n;
    for ( ll i = 2; i * i <= a; i++ ) {
        if ( a % i == 0 ) {
            res = res / i * ( i - 1 ); //先进行除法是为了防止中间数据的溢出
            while ( a % i == 0 )
                a /= i;
        }
    }
    if ( a > 1 )
        res = res / a * ( a - 1 );
    return res;
}

ll mul2 ( ll a, ll b, ll mod ) {
    a %= mod;
    b %= mod;
    ll res = 0, base = a;
    while ( b ) {
        if ( b & 1 )
            res = ( res + base ) % mod;
        base = ( base * 2 ) % mod;
        b >>= 1;
    }
    return res;
}

ll pow2 ( ll a, ll b, ll mod ) {
    a %= mod;
    b %= phi ( mod );
```

```
    ll res = 1, base = a;
    while ( b ) {
        if ( b & 1 )
            res = ( res * base ) % mod;
        base = ( base * base ) % mod;
        b >>= 1;
    }
    return res;
}

int main () {
#ifdef LOCAL
    freopen ( "in", "r", stdin );
    freopen ( "out", "w", stdout );
#endif
    ll a, b, mod;
    while ( ~scanf ( "%lld%lld%lld", &a, &b, &mod ) ) {
        printf ( "%lld\n", pow2 ( a, b, mod ) );
    }

    return 0;
}
```