

# 2020牛客暑期多校训练营（第三场）

## 比赛情况

题号	A	B	C	D	E	F	G	H	I	J	K	L
状态	0	0	0	0	0	0	0	-	-	-	-	0

0 在比赛中通过 0 赛后通过! 尝试了但是失败了- 没有尝试

比赛时间

2020-07-18 12:00-17:00

## 题解

### F - Fraction Construction Problem

给  $1 \leq a, b \leq 2e6$  问是否存在  $1 \leq c, d, e, f \leq 4e12$  且  $d, f \leq b$  使得  $\frac{cd}{ab} - \frac{ef}{ab} = \frac{ab}{ab}$

分类讨论一下，如果  $a$  和  $b$  不互质可以很容易构造出来；如果互质，分解  $b$  如果  $b$  只有一种质因子则不存在，否则令  $d$  和  $f$  为  $b$  的两个互质的因数，然后通分，分子就是个拓欧。

```
#pragma GCC optimize(2)
#pragma GCC optimize(3,"Ofast","inline")
#include<bits/stdc++.h>
#define ALL(x) (x).begin(),(x).end()
#define ll long long
#define ull unsigned long long
#define pii_ pair<int,int>
#define mp_ make_pair
#define pb push_back
#define fi first
#define se second
#define rep(i,a,b) for(int i=(a);i<=(b);i++)
#define per(i,a,b) for(int i=(a);i>=(b);i--)
#define show1(a) cout<<#a<<" = "<<a<<endl
#define show2(a,b) cout<<#a<<" = "<<a<<"; "<<#b<<" = "<<b<<endl
using namespace std;
const ll INF = 1LL<<60;
const int inf = 1<<30;
const int maxn = 2e6+5;
const ll B = 4e12;
inline void fastio() {ios::sync_with_stdio(false);cin.tie(0);cout.tie(0);}

bool vis[maxn];
vector<int> prime;
```

```
inline ll gcd(ll a,ll b) {return b==0?a:gcd(b,a%b);}
inline ll exgcd(ll a,ll b,ll &x,ll &y)
{
    ll d;
    if(!b) d=a,x=1,y=0;
    else {d=exgcd(b,a%b,y,x);y-=a/b*x;}
    return d;
}
void init()
{
    int n = 2e6;
    rep(i,2,n){
        if(!vis[i]) prime.pb(i);
        for(ll j=(ll)i*i;j<=n;j+=i) vis[j] = 1;
    }
}
int main()
{
    int _; init();
    ll a,b,c,d,e,f;
    for(scanf("%d",&_);_--){
        scanf("%lld%lld",&a,&b);
        if(b==1){
            printf("-1 -1 -1 -1\n");
        }else{
            ll k = gcd(a,b);
            if(k > 1){
                a/=k,b/=k;
                d = b,f = b;
                c = a+1,e = 1;
                printf("%lld %lld %lld %lld\n",c,d,e,f); continue;
            }else{
                if(!vis[b]){ // ab互质且b为质数
                    printf("-1 -1 -1 -1\n"); continue;
                }
                for(int x:prime){
                    if(b%x==0){
                        d = 1;
                        while(b%x==0) d*=x,b/=x;
                        break;
                    }
                }
                if(b==1){ // 只有一种质因子
                    printf("-1 -1 -1 -1\n"); continue;
                }
                f = b;
                exgcd(f,d,c,e);
                if(c<0){
                    ll k = abs(c)/d+1;
                    c += k*d,e -= k*f;
                }
            }
        }
    }
}
```

```
    }  
    printf("%lld %lld %lld %lld\n",c*a,d,-e*a,f);  
    }  
    }  
    }  
    return 0;  
}
```

## 比赛总结与反思

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Last update: 2020/07/19 00:10