

# NTT

\$1004535809\$ 的原根是 \$3\$ 别算了  $\square$ x

补充板子

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#include<bits/stdc++.h>
#define ll long long
using namespace std;
const ll maxn = 4e6+10;
const ll inf = 1e9;
const double eps = 1e-8;
const ll mod = 998244353;

ll
f[maxn],g[maxn],mxn,w[maxn],n,m,rw[maxn],t[maxn],bit,pos[maxn],s[maxn],limit
;

inline ll quick_mul(ll a,ll b,ll p){
    unsigned long long c=(long double) a/p*b;
    ll ret=a*b-(unsigned long long)c*p;
    ret%=p;
    while(ret<0) ret+=p;
    return ret%p;
}
inline ll quick_power(ll a,ll b,ll p){
    ll ret=1;
    while(b){
        if(b&1) ret=quick_mul(ret,a,p);
        a=quick_mul(a,a,p);
        b>>=1;
    }
    while(ret<0) ret+=p;
    return ret%p;
}

void prepare() {
    for(int i=0;i<mxn;i++) pos[i]=pos[i>>1]>>1|((i&1)<<(limit-1));
    w[0]=1;w[1]=quick_power(3,(mod-1)/mxn,mod);
    for(int i=2;i<=mxn;i++) w[i]=1ll*w[i-1]*w[1]%mod;
    rw[0]=1,rw[1]=quick_power(quick_power(3,mod-2,mod),(mod-1)/mxn,mod);
    for(int i=2;i<=mxn;i++) rw[i]=1ll*rw[i-1]*rw[1]%mod;
}

void ntt(ll *r,ll op) {
    for(int i=1;i<mxn;i++) if(pos[i]>i) swap(r[i],r[pos[i]]);
    for(int i=1,d=mxn>>1;i<mxn;i<=<=1,d>>=1)
        for(int j=0;j<mxn;j+=i<<1)
            for(int k=0;k<i;k++) {

```

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        int x=r[j+k],y=1ll*r[i+j+k]*(op==1?w:rw)[k*d]%mod;
        r[j+k]=(x+y)%mod,r[i+j+k]=(x-y+mod)%mod;
    }
    if(op==-1) {
        int inv=quick_power(mxn,mod-2,mod);
        for(int i=0;i<mxn;i++) r[i]=1ll*r[i]*inv%mod;
    }
}

/*void solve(ll l,ll r) {
    if(l==r) return ;
    int mid=(l+r)>>1;
    solve(l,mid);
    for(int i=l;i<=mid;i++) t[i-l]=f[i],s[i-l]=g[i-l];
    for(int i=mid+1;i<=r;i++) t[i-l]=0,s[i-l]=g[i-l];
    for(bit=0,N=1;N<=r-l;N<=<=1,bit++);
    for(int i=r-l+1;i<N;i++) t[i]=s[i]=0;
    for(int i=1;i<N;i++) pos[i]=pos[i>>1]>>1|((i&1)<<(bit-1));
    ntt(s,1),ntt(t,1);
    for(int i=0;i<N;i++) s[i]=1ll*s[i]*t[i]%mod;
    ntt(s,-1);
    for(int i=mid+1;i<=r;i++) f[i]=(f[i]+s[i-l])%mod;
    solve(mid+1,r);
}*/

int main() {
    scanf("%lld %lld",&n,&m);
    for(int i=0;i<=n;i++) scanf("%lld",&f[i]);
    for(int i=0;i<=m;i++) scanf("%lld",&g[i]);
    for(mxn=1;mxn<=n+m;mxn<=<=1) limit++;
    prepare();
    ntt(f,1);
    ntt(g,1);
    for(int i=0;i<=mxn;i++){
        f[i]=quick_mul(f[i],g[i],mod);
    }
    ntt(f,-1);
    for(int i=0;i<=m+n;i++) printf("%lld ",f[i]);
    return 0;
}
```

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Last update: 2021/07/20 16:49