```cpp
ll power_mod(ll a, ll b) {
    ll ret = 1; a %= mod;
    assert(b >= 0);
    for(; b; b >>= 1, a = a * a % mod)
        if(b & 1) ret = ret * a % mod;
    return ret;
}
namespace linear_seq {
    const int N=10010;
    ll res[N],base[N],_c[N],_md[N];

    vector<ll> Md;
    void mul(ll *a,ll *b,ll k) {
        rep(i,0,k+k) _c[i]=0;
        rep(i,0,k) if (a[i]) rep(j,0,k) _c[i+j]=(_c[i+j]+a[i]*b[j])%mod;
        for (ll i=k+k-1;i>=k;i--) if (_c[i])
            rep(j,0,SZ(Md)) _c[i-k+Md[j]]=(_c[i-k+Md[j]]-
_c[i]*_md[Md[j]])%mod;
        rep(i,0,k) a[i]=_c[i];
    }
    ll solve(ll n,VI a,VI b) {
        ll ans=0,pnt=0;
        ll k=SZ(a);
        assert(SZ(a)==SZ(b));
        rep(i,0,k) _md[k-1-i]=-a[i];_md[k]=1;
        Md.clear();
        rep(i,0,k) if (_md[i]!=0) Md.push_back(i);
        rep(i,0,k) res[i]=base[i]=0;
        res[0]=1;
        while ((1ll<<pnt)<=n) pnt++;
        for (ll p=pnt;p>=0;p--) {
            mul(res,res,k);
            if ((n>>p)&1) {
                for (ll i=k-1;i>=0;i--) res[i+1]=res[i];res[0]=0;
                rep(j,0,SZ(Md)) res[Md[j]]=(res[Md[j]]-res[k]*_md[Md[j]])%mod;
            }
        }
        rep(i,0,k) ans=(ans+res[i]*b[i])%mod;
        if (ans<0) ans+=mod;
        return ans;
    }
    VI BM(VI s) {
        VI C(1,1),B(1,1);
        ll L=0,m=1,b=1;
        rep(n,0,SZ(s)) {
            ll d=0;
            rep(i,0,L+1) d=(d+(ll)C[i]*s[n-i])%mod;
            if (d==0) ++m;
            else if (2*L<=n) {
                VI T=C;
                ll c=mod-d*power_mod(b,mod-2)%mod;
                while (SZ(C)<SZ(B)+m) C.pb(0);
                rep(i,0,SZ(B)) C[i+m]=(C[i+m]+c*B[i])%mod;
                L=n+1-L; B=T; b=d; m=1;
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55              } else {
56                  ll c=mod-d*power_mod(b,mod-2)%mod;
57                  while (SZ(C)<SZ(B)+m) C.pb(0);
58                  rep(i,0,SZ(B)) C[i+m]=(C[i+m]+c*B[i])%mod;
59                  ++m;
60              }
61          }
62          return C;
63      }
64      ll gao(VI a,ll n) {
65          VI c=BM(a);
66          c.erase(c.begin());
67          rep(i,0,SZ(c)) c[i]=(mod-c[i])%mod;
68          return solve(n,c,VI(a.begin(),a.begin()+SZ(c)));
69      }
70  };
71
```