```cpp
#include <algorithm>
#include <fstream>
#include <iomanip>
#include <iostream>
#include <map>
#include <math.h>
#include <set>
#include <stdio.h>
#include <string>
#include <utility>
#include <vector>

using namespace std;

using ll = long long;

const long long P = 1000000007;

class C {
public:
  int n;
  vector<long long> fac, inv, facInv;

  long long power(long long e, long long x) {
    if (x == 0)
      return 1;
    if (x == 1)
      return e;
    if (x % 2 == 0)
      return power((e * e) % P, x / 2);
    return (e * power(e, x - 1)) % P;
  }

  C(int n_) {
    n = n_;
    fac.resize(n + 1);
    inv.resize(n + 1);
    facInv.resize(n + 1);
    fac[0] = fac[1] = 1;
    for (int i = 2; i <= n; i++)
      fac[i] = (i * fac[i - 1]) % P;
    inv[0] = inv[1] = 1;
    for (int i = 2; i <= n; i++)
      inv[i] = power(i, P - 2);
    facInv[0] = facInv[1] = 1;
    for (int i = 2; i <= n; i++)
      facInv[i] = (inv[i] * facInv[i - 1]) % P;
  }

  long long comb(int N, int K) {
```

```
51      if (N < K || K < 0 || N < 0)
52        return 0;
53      if (N == 0 || K == 0 || K == N)
54        return 1;
55      return ((fac[N] * facInv[K]) % P * facInv[N - K]) % P;
56    }
57
58    long long hcomb(int N, int K) {
59      if (N == 0 && K == 0)
60        return 1;
61      return comb(N + K - 1, K);
62    }
63
64    long long mul(long long a, long long b) { return (a * b) % P; }
65
66    long long add(long long a, long long b) { return (a + b) % P; }
67
68    // find c
69    // where a^c = b (mod P)
70    long long dlp(long long a, long long b) {
71      long long m = ceil(sqrt(P));
72      map<long long, long long> mp;
73      for (int i = 0; i < m; i++)
74        mp[power(a, i)] = i;
75      long long ainvm = power(power(a, m), P - 2);
76      cout << m << endl;
77      for (int i = 0; i < m; i++) {
78        if (mp.find(b) != mp.end()) {
79          return i * m + mp[b];
80        }
81        b = mul(b, ainvm);
82      }
83      return -1;
84    }
85  };
86
87  template<long long M>
88  class mint {
89  public:
90    ll a;
91
92    mint(ll a = 0) : a(a % M) {}
93
94    ll &v() { return a; }
95
96    ll const &v() const { return a; }
97
98    mint operator+(const mint rhs) const {
99      return mint(*this) += rhs;
100   }
```

```
101
102   mint operator-(const mint rhs) const {
103     return mint(*this) -= rhs;
104   }
105
106   mint operator*(const mint rhs) const {
107     return mint(*this) *= rhs;
108   }
109
110   mint operator/(const mint rhs) const {
111     return mint(*this) /= rhs;
112   }
113
114   mint pow(ll x) const {
115     mint ret(1);
116     mint acc = a;
117     while (x > 0) {
118       if (x % 2) {
119         ret *= acc;
120       }
121       acc *= acc;
122       x >>= 1;
123     }
124     return ret;
125   }
126
127   mint &operator+=(const mint rhs) {
128     a += rhs.a;
129     a %= M;
130     return *this;
131   }
132
133   mint &operator-=(const mint rhs) {
134     a -= rhs.a + M;
135     a %= M;
136     return *this;
137   }
138
139   mint &operator*=(const mint rhs) {
140     a *= rhs.a;
141     a %= M;
142     return *this;
143   }
144
145   mint &operator/=(const mint rhs) {
146     a *= rhs.pow(M - 2).v();
147     a %= M;
148     return *this;
149   }
150
```

```
151 };
152
153 std::ostream &operator<<(ostream &stream, const mint<P> &m) {
154   return stream << m.v();
155 }
156
157
158 ll power(ll e, ll x) {
159   if (x == 0) return 1;
160   ll acc = e;
161   ll ret = 1;
162   while (x > 0) {
163     if (x % 2) {
164       ret *= acc;
165     }
166     acc *= acc;
167     x >>= 1;
168   }
169   return ret;
170 }
171
172 ll tot(ll x) {
173   map<ll, int> primes;
174   ll y = x;
175   for (ll i = 2; i * i <= y; i++) {
176     if (y % i == 0) {
177       primes[i]++;
178       y /= i;
179       i--;
180     }
181   }
182   if (y > 1) primes[y]++;
183
184   ll ret = 1;
185   for (auto &it : primes) {
186     ret *= (power(it.first, it.second) - power(it.first, it.second - 1));
187   }
188   return ret;
189 }
190
191 int main() {
192   C cmp(100);
193   long long c = cmp.dlp(100, 192971657);
194   cout << c << endl;
195   cout << cmp.power(100, c) << endl;
196   cout << cmp.power(100, 10000000) << endl;
197
198   mint<P> a(10), b(100), d(100);
199   cout << d / a << endl;
200   cout << tot(1000000007) << endl;
```

```
201
202   return 0;
203 }
204
```