

```
1 #include "../bits/stdc++.h"
2 const int MOD = 1e9 + 7;
3
4 // a^b O(log b)
5 template<typename T>
6 T mypow(T a, T b)
7 {
8     if (b == 0)
9         return 1;
10    T tmp = mypow(a, b / 2);
11    if (b % 2)
12        return (((tmp * tmp) % MOD) * a) % MOD;
13    else
14        return (tmp * tmp) % MOD;
15 }
16
17 // nCk O(n + klogMOD)
18 long long comb(int n, int k)
19 {
20     long long res = 1;
21     k = std::min(n - k, k);
22     for (int i = n - k + 1; i <= n; i++)
23         res = (res * i) % MOD;
24     for (int i = 1; i <= k; i++)
25         res = (res * mypow(static_cast<long long>(i), static_cast<long long>(MOD - 2))) % MOD;
26     return res;
27 }
28
29 // nHk = n+k-1 C k
30 long long H(int n, int k)
31 {
32     return comb(n + k - 1, k);
33 }
34
35 // v[i][j] := iCj
36 std::vector<std::vector<long long>> comb2(int n)
37 {
38     std::vector<std::vector<long long>> v(n + 1, std::vector<long long>(n + 1, 0));
39     for (int i = 0; i < (int)v.size(); i++)
40     {
41         v[i][0] = 1;
42         v[i][i] = 1;
43     }
44     for (int j = 1; j < (int)v.size(); j++)
45     {
46         for (int k = 1; k < j; k++)
47         {
48             v[j][k] = (v[j - 1][k - 1] + v[j - 1][k]);
49             v[j][k] %= MOD;
50         }
51     }
52     return v;
53 }
54
```