

← Practice Programming Problems / Selection of Cities

Selection of Cities

Submissions Attempted by: 537 | Solved by: 182 | Partially Solved by: 95 | ★★★★

Combinatorics Easy Math Edit

Problem Editorial My Submissions Analytics

₹ SysCloud Testing Chall...

Editorial | Selection of Cities

Prerequisites

Binomial theorem, Binomial coefficients, sum of binomial coefficients.

Explanation

Let us say that m cities are selected. For a particular value of m the number of ways for selecting the cities is ${}^{n}C_{m}$. As stated any number of cities can be selected any city can be selected. Also, at least 1 city has to selected. So, the final answer is $\sum_{m=0}^{n} C_{m} = 1$.

We can easily find this using the binomial theorem. Expand $(a+b)^n$ using binomial theorem. Then substitute a=1 and b=1, we will get $\sum {}^nC_m$, 0<=m<=n. Therefore from this we get that $2^n = \sum {}^nC_m$, 0<=m<=n. If we subtract nC_0 from both sides, we get the answer to our problem as $2^n - 1$.

 2^{n} %100000007 can be easily calculated using modular exponentiation by right to left binary method. The complexity of this algorithm for a particular n will be O(log(n)).

Edit Editorial

IS THIS EDITORIAL HELPFUL?



Yes, it's helpful



No, it's not helpful

2 developer(s) found this editorial helpful.

Author Solution by PRATEEK KUMAR

- 1. $//0(\log(n))$
- 2. #include<cstdio>

```
3. #define mod 1000000007
 4. long long pow mod(long long b,long long e)
 5. {
            long long ans=1;
 6.
 7.
            b%=mod;
            while(e>0)
 8.
 9.
10.
                     if(e&1)
                             ans=(ans*b)%mod;
11.
                             b=(b*b)%mod;
12.
13.
                             e>>=1;
14.
15.
            return ans%mod;
16. }
17. int main()
18. {
19.
            long long t,n;
20.
            //FILE* f=freopen("out1.txt","w",stdout);
            //FILE* f1=freopen("in1.txt","r",stdin);
21.
22.
            scanf("%lld",&t);
            while(t--)
23.
24.
            {
25.
                     scanf("%lld",&n);
26.
                     long long ans=pow_mod(2,n)-1;
27.
                     printf("%lld\n",ans);
28.
29.
            }
            //fclose(f);
30.
            //fclose(f1);
31.
32.
            return 0;
33. }
34.
35. /*0(n)
36. // only 2 input files will pass this solution
37.
38. #include<cstdio>
39. #define mod 1000000007
40. long long int func(long long int a)
41. {
42. long long ans=1,i;
43. for(i=1;i \le a;i++)
44. ans=(ans*2)%mod;
45.
   return ans;
46. }int main()
47. {
            long long t,n;
            scanf("%lld",&t);
48.
49.
50.
            while(t--)
51.
52.
                     scanf("%lld",&n);
53.
                     long long ans=(func(n)-1)%mod;
                     printf("%lld\n",ans);
54.
55.
            }return 0;
56. }
```

57.	
58.	*,
59	

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Xsquare And Maximum Sum Subarray Solved by 36

Square with 1's Solved by 5

The Power of Factorization Solved by 22

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User	Result	Time	Lang
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Jayanth		1.3397	C++
HARSH VA		0.5397	С
HARSH VA		0.5028	С
HARSH VA		0.503	С
Deepak S		1.5666	C++
Deepak S		1.2508	Python
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TRENDING NOTES

Number Theory - III written by Boris Sokolov

Exact String Matching Algorithms written by Alei Reyes

Binary Indexed Tree or Fenwick Tree written by Chandan Mittal

Small tricks in for loop written by Rangeesh

Strings And String Functions written by Vinay Singh

more ...

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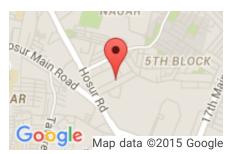
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