**Golomb Sequence**Problem Code: **GOLOMB**

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The Golomb sequence G1,G2,…G1,G2,… is a non-decreasing integer sequence such that for each positive integer nn, GnGn is the number of occurrences of nn in this sequence. The first few elements of GG are [1,2,2,3,3,4,4,4,5,…][1,2,2,3,3,4,4,4,5,…]. Do you know the recurrence relation for the Golomb sequence? It is G1=1G1=1 and Gn+1=1+Gn+1−GGnGn+1=1+Gn+1−GGn for each n≥1n≥1. A self-describing sequence, isn't it?

Mr. Strange wants to learn CP, so he asked Chef, who is one of the best competitive programmers in the world, to teach him. Chef decided to test his ability by giving him the following task.

Find the sum of squares of the LL-th through RR-th term of the Golomb sequence, i.e. S=∑Ri=LG2iS=∑i=LRGi2. Since the sum can be quite large, compute it modulo 109+7109+7.

Can you help Mr. Strange carry out this task given to him by his teacher?

**Input**

* The first line of the input contains a single integer TT denoting the number of test cases. The description of TT test cases follows.
* The first and only line of each test case contains two space-separated integers LL and RR.

**Output**

For each test case, print a single line containing one integer SS modulo 109+7109+7.

**Constraints**

* 1≤T≤1051≤T≤105
* 1≤L≤R≤10101≤L≤R≤1010

**Subtasks**

**Subtask #1 (50 points):**

* T≤102T≤102
* R≤109R≤109

**Subtask #2 (50 points):** original constraints

**Example Input**

3

1 5

2 4

100 100

**Example Output**

27

17

441

**Explanation**

**Example case 1:** 12+22+22+32+32=2712+22+22+32+32=27

**Example case 2:** 22+22+32=1722+22+32=17

**Example case 3:** 212=441

Solution:

#include<bits/stdc++.h>

#define pb push\_back

#define int long long int

#define INF 1e18

#define vec vector<int>

#define REP(i,a,b) for(i=a;i<b;i++)

using namespace std;

vector<int> g(10000001),id(10000001),ans(10000001);

int mod=1e9+7;

int answer(int n)

{

auto it=upper\_bound(id.begin(),id.end(),n);

int ind=it-id.begin();

int res=ans[ind-1];

res=((res%mod)+(((((n - id[ind-1])%mod)\*ind)%mod)\*ind)%mod )%mod;

return (res+mod)%mod;

}

main()

{

int t=1;

cin>>t;

g[0]=0,id[0]=0,ans[0]=0,g[1]=1,id[1]=1,ans[1]=1;

for(int i=2;i<10000000;i++)

{

g[i]=(1+g[i-g[g[i-1]]])%mod;

id[i]=(id[i-1]+g[i]);

ans[i] = (ans[i-1] + (((i\*i)%mod)\*g[i])%mod) %mod;

}

while(t--)

{

int l,r;

cin>>l>>r;

cout<<(answer(r)-answer(l-1)+mod)%mod<<"\n";

}

}