标签 概率期望 下的文章

「2019 Multi-University Training Contest 2」Everything Is Generated In Equal Probability (https://blog.orzsiyuan.com/archives/2019-Multi-University-Training-Contest-2-Everything-Is-Generated-In-Equal-Probability/)

> 题目链接：HDU 6595 (http://acm.hdu.edu.cn/showproblem.php?pid=6595)

Y_UME 有一个整数 N 和一串有趣的代码：

1 an interesting program

```
function SUBSEQUENCE(Array)
    result ← randomly select a subsequence of Array which could be empty in equal probability
    return result
end function
function CNTINVERSIONPAIRS(Array)
    return the number of inversion pairs of Array
end function
function CALCULATE(Array)
    cnt ← 0
    if Length(Array) > 0 then
        cnt ← CntInversionPairs(Array)
        Temp ← SUBSEQUENCE(Array)
        cnt ← cnt + CALCULATE(Temp)
    end if
    return cnt
end function
```

首先，他先等概率随机一个正整数 $n \in [1, N]$，再等概率随机一个长度为 n 的排列。最后他会将这个排列传入函数 Calculate 并得到一个返回值。请你求出这个值的期望，答案对 998244353 取模。

本题有多组数据。

数据范围：$1 \le N \le 3000$，$\sum N \le 5 \times 10^4$。

Siyuan (https://blog.orzsiyuan.com/author/1/) 2019 年 07 月 29 日

「Codeforces 1156F」Card Bag (https://blog.orzsiyuan.com/archives/Codeforces-1156F-Card-Bag/)

> 题目链接：Codeforces 1156F (https://codeforces.com/contest/1156/problem/F)

你有一个装有 n 张卡片的袋子，第 i 张卡片上的数字为 a_i。

接下来你要玩一个卡片游戏。每一回合，你会随机选择选择袋子里的一张卡片（所有留在袋子里的卡片都是等概率选择的）。从第二回合起，每当你拿出一张卡片（将上面的数字记为 x），你都会和上一回合的卡片（将上面的数字记为 y）比较：

- 如果 $x < y$，你将会输掉游戏，游戏结束。
- 如果 $x = y$，你将会赢得游戏，游戏结束。
- 如果 $x > y$，游戏继续。

如果袋子里没有卡片了，那么你也将输掉游戏。**注意：你取出来的卡片不会重新放回袋子里。**

请你求出赢得游戏的概率，答案对 998244353 取模。

数据范围：$2 \le n \le 5000$，$1 \le a_i \le n$。

Siyuan（https://blog.orzsiyuan.com/author/1/） 2019 年 05 月 20 日

「Codeforces 1153F」Serval and Bonus Problem (https://blog.orzsiyuan.com/archives/Codeforces-1153F-Serval-and-Bonus-Problem/)

> 题目链接：Codeforces 1153F (https://codeforces.com/contest/1153/problem/F)

你有一条长度为 l 的线段，我们通过随机选择 2 点，在这条线端上随机选择 n 条线段。这 $2n$ 个点将线段分成了 $2n+1$ 个区间。你需要对于给定的 k，求出被这 n 个随机线段中至少 k 个覆盖的区间的期望总长度。答案对 998244353 取模。

数据范围：$1 \le k \le n \le 2000$，$1 \le l \le 10^9$。

Siyuan（https://blog.orzsiyuan.com/author/1/） 2019 年 04 月 29 日

「Codeforces 1139D」Steps to One (https://blog.orzsiyuan.com/archives/Codeforces-1139D-Steps-to-One/)

> 题目链接：Codeforces 1139D (https://codeforces.com/contest/1139/problem/D)

Vivek 最初有一个空数组 a 和一个整数 m。接下来他会进行如下操作：

1. 随机选择一个 1 到 m 之间的整数 x 并将它加入到数组 a 的最后。
2. 计算出数组 a 中元素的最大公约数。
3. 如果最大公约数等于 1 那么退出操作。
4. 否则回到步骤 1。

请你计算出数组 a 的期望长度，对 10^9+7 取模。

数据范围：$1 \le m \le 10^5$。

Siyuan (https://blog.orzsiyuan.com/author/1/) 2019 年 04 月 03 日

「Codeforces 280C」Game on Tree (https://blog.orzsiyuan.com/archives/Codeforces-280C-Game-on-Tree-md/)

> 题目链接：Codeforces 280C (https://codeforces.com/contest/280/problem/C)

Momiji 有一棵包含 n 个节点的有根树。节点从 1 到 n 编号，其中根节点的编号为 1 。Momiji 打算在这棵树上玩一个游戏。

整个游戏包含很多步。每一步，Momiji 选择一个存在的节点，然后把这个节点作为根的子树删除，选择的节点本身也被删除。当这棵树为空时，游戏结束。换言之，当节点 1 被删除后游戏结束。

你需要求出游戏结束的期望步数。

数据范围：$1 \le n \le 10^5$。

Siyuan (https://blog.orzsiyuan.com/author/1/) 2019 年 03 月 19 日

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