

标签 图论 下的文章

🏠 首页 (<https://blog.orzsiyuan.com/>) / 图论

「Codeforces 1217D」 Coloring Edges (<https://blog.orzsiyuan.com/archives/Codeforces-1217D-Coloring-Edges/>)

题目链接: Codeforces 1217D (<https://codeforces.com/contest/1217/problem/D>)

你有一个包含 n 个点和 m 条边的有向图（没有自环或重边）。

定义一张图的 k 染色为：将每条边染成 k 种颜色中的一种。一个 k 染色是好的当且仅当不存在一个环满足环上的所有边颜色相同。

你需要求出这张图的 k 染色，并最小化 k 的值。

数据范围： $2 \leq n \leq 5000$, $1 \leq m \leq 5000$ 。

👤 Siyuan (<https://blog.orzsiyuan.com/author/1/>) ⏰ 2019 年 09 月 14 日

「Codeforces 1174F」 Ehab and the Big Finale (<https://blog.orzsiyuan.com/archives/Codeforces-1174F-Ehab-and-the-Big-Finale/>)

题目链接: Codeforces 1174F (<https://codeforces.com/problemset/problem/1174/F>)

这是一道交互题。

给定一棵有 n 个点的树，节点 1 为根节点。

我们选择一个隐藏节点 x ，你需要进行以下三种操作来找到这个节点 x 的编号。

- $d u$ ：你会得到节点 u 和 x 之间的距离。两个节点之间的距离定义为最短路径上的边数。
- $s u$ ：你会得到节点 u 到 x 的最短路径上的第二个节点。但是如果 u 不是 x 的祖先，你会直接得到 Wrong answer 的结果！
- $! u$ ：回答隐藏节点 x 的编号为 u 。

你需要在 36 次询问（不包括回答）内找到 x 的编号。这个隐藏节点 x 不会根据你的询问而改变。

数据范围： $2 \leq n \leq 2 \times 10^5$ 。

👤 Siyuan (<https://blog.orzsiyuan.com/author/1/>) ⏰ 2019 年 08 月 07 日

「Codeforces 1189D2」 Add on a Tree: Revolution (<https://blog.orzsiyuan.com/archives/Codeforces-1189D2-Add-on-a-Tree-Revolution/>)

题目链接: Codeforces 1189D2 (<https://codeforces.com/contest/1189/problem/D2>)

你有一个棵 n 个点的树，初始所有的边上的数字都是 0。对于每次操作，你可以选择两个不同的叶子节点 u, v 和一个任意整数 x 并把 $u - v$ 这条简单路径上的边加上 x 。

每条边都有一个目标状态，用一个两两不同的非负偶数表示。你需要判断这个目标状态是否可以通过有限次操作达到。如果可行则输出 YES 和构造的方案；否则输出 NO。

注意叶子节点的定义为度数为 1 的点。

数据范围: $2 \leq n \leq 10^5$ 。

👤 Siyuan (<https://blog.orzsiyuan.com/author/1/>) ⏰ 2019 年 08 月 05 日

「Codeforces 1189D1」 Add on a Tree (<https://blog.orzsiyuan.com/archives/Codeforces-1189D1-Add-on-a-Tree/>)

题目链接: Codeforces 1189D1 (<https://codeforces.com/contest/1189/problem/D1>)

你有一个棵 n 个点的树，初始所有的边上的数字都是 0。对于每次操作，你可以选择两个不同的叶子节点 u, v 和一个任意实数 x 并把 $u - v$ 这条简单路径上的边加上 x 。

我们令 w_i 表示最终第 i 条边上的实数，是否对于所有的 $w_i \in \mathbb{R}, 1 \leq i < n$ ，都存在有限的操作使得所有的边都满足条件？如果可行则输出 YES 否则输出 NO。

注意叶子节点的定义为度数为 1 的点。

数据范围: $2 \leq n \leq 10^5$ 。

👤 Siyuan (<https://blog.orzsiyuan.com/author/1/>) ⏰ 2019 年 08 月 05 日

「Codeforces 1199E」 Matching vs Independent Set (<https://blog.orzsiyuan.com/archives/Codeforces-1199E-Matching-vs-Independent-Set/>)

题目链接: Codeforces 1199E (<https://codeforces.com/contest/1199/problem/E>)

给定一个由 $3 \cdot n$ 个点、 m 条边组成的图。你需要找到一组大小为 n 的边的匹配，或者找到一组大小为 n 的独立集。

一组边的匹配表示不存在两条边拥有一个共同的点。

一组独立集表示不存在两个点被同一条边相连。

如果能找到一组边的匹配，输出 Matching 和方案；如果能找到一组独立集，输出 IndSet 和方案；否则输出 Impossible。

本题有 T 组数据。

数据范围： $1 \leq \sum n \leq 10^5$, $0 \leq \sum m \leq 5 \times 10^5$ 。

👤 Siyuan (<https://blog.orzsiyuan.com/author/1/>) ⏰ 2019 年 08 月 03 日

「WC 2011」最大 XOR 和路径 (<https://blog.orzsiyuan.com/archives/WC-2011-Maximum-Xor-Path/>)

题目链接：BZOJ 2115 (<https://www.lydsy.com/JudgeOnline/problem.php?id=2115>)

考虑一个包含 n 个点和 m 条边的无向连通图，节点编号为 1 到 n ，第 i 条边的边权为非负整数 D_i 。试求出一条从 1 号节点到 n 号节点的路径，使得路径上经过的边的全是的 XOR 和最大。

路径可以重复经过某些点或边，当一条边在路径中出现了多次时，其权值在计算 XOR 和时也要被计算相应多的次数。

数据范围： $1 \leq n \leq 5 \times 10^4$, $1 \leq m \leq 10^5$, $0 \leq D_i \leq 10^{18}$ 。

👤 Siyuan (<https://blog.orzsiyuan.com/author/1/>) ⏰ 2019 年 07 月 31 日

「2019 Multi-University Training Contest 2」 Harmonious Army (<https://blog.orzsiyuan.com/archives/2019-Multi-University-Training-Contest-2-Harmonious-Army/>)

题目链接：HDU 6598 (<http://acm.hdu.edu.cn/showproblem.php?pid=6598>)

在一个军队里有 n 名士兵。每名士兵需要分配一个任务：Mage 或 Warrior。这些士兵中有 m 对士兵有良好的凝聚力。如果这两名士兵都参加 Warrior 任务，军队的效率会增加 a ；如果这两名士兵都参加 Mage 任务，军队的效率会增加 c ；否则军队的效率会增加 $b = \frac{a}{4} + \frac{c}{3}$ （保证 $4 \mid a, 3 \mid c$ ）。

你需要求出军队效率的最大值。

本题有多组数据。

数据范围： $1 \leq n \leq 500$, $0 \leq m \leq 10^4$, $1 \leq a, b \leq 4 \times 10^6$, $\sum n \leq 5 \times 10^3$, $\sum m \leq 5 \times 10^4$ 。

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

「Codeforces 1186F」 Vus the Cossack and a Graph (<https://blog.orzsiyuan.com/archives/Codeforces-1186F-Vus-the-Cossack-and-a-Graph/>)

题目链接: Codeforces 1186F (<https://codeforces.com/contest/1186/problem/F>)

Vus 有一张包含 n 个点和 m 条边的图。设 d_i 表示第 i 个点的度数。他需要保留 $\lceil \frac{n+m}{2} \rceil$ 条边, 设 f_i 表示新

图中第 i 个点的度数。他需要对于所有的 i 保证 $\left\lceil \frac{d_i}{2} \right\rceil \leq f_i$ 。

请你帮 Vus 保留一些边使这张图满足条件。

数据范围: $1 \leq n \leq 10^6$, $0 \leq m \leq 10^6$ 。

👤 Siyuan (<https://blog.orzsiyuan.com/author/1/>) ⏰ 2019 年 07 月 03 日

「Codeforces 1156D」 0-1-Tree (<https://blog.orzsiyuan.com/archives/Codeforces-1156D-0-1-Tree/>)

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

你有一棵由 n 个节点组成的树, 每条边上有一个数字 0 或 1。

假如我们从节点 x 开始沿着简单路径到达节点 y , 一旦经过了数字为 1 的边就不会经过数字为 0 的边。那么我们称二元组 (x, y) ($x \neq y$) 是合法的。

你的任务是找出树上合法的二元组数量。

数据范围: $2 \leq n \leq 2 \times 10^5$ 。

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

「Codeforces 1152E」 Neko and Flashback (<https://blog.orzsiyuan.com/archives/Codeforces-1152E-Neko-and-Flashback/>)

题目链接: Codeforces 1152E (<https://codeforces.com/contest/1152/problem/E>)

现在 Neko 有一个长度为 n 的数组 a 和一个长度为 $n - 1$ 的排列 p 。现在他进行如下操作:

- 构造一个长度为 $n - 1$ 的数组 b , 其中 $b_i = \min(a_i, a_{i+1})$ 。
- 构造一个长度为 $n - 1$ 的数组 c , 其中 $c_i = \max(a_i, a_{i+1})$ 。

- 构造一个长度为 $n - 1$ 的数组 b' , 其中 $b'_i = b_{p_i}$ 。
- 构造一个长度为 $n - 1$ 的数组 c' , 其中 $c'_i = c_{p_i}$ 。

然而 Neko 只记得数组 b' 和 c' 了, 将原来的数组 a 和排列 p 都忘记了。他想让你帮他找到任何一个合法的数组 a 。如果没有任何一个可能的数组, 那么输出 -1 。

数据范围: $2 \leq n \leq 10^5$, $1 \leq b'_i, c'_i \leq 10^9$ 。

● Siyuan (<https://blog.orzsiyuan.com/author/1/>) ⊖ 2019 年 05 月 19 日

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