标签 数学归纳法 下的文章

「Codeforces 1186E」Vus the Cossack and a Field (https://blog.orzsiyuan.com/archives/Codeforces-1186E-Vus-the-Cossack-and-a-Field/)

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

Vus 有一个 $n \times m$ 的 01 矩阵，他通过如下方法构造了一个无限大的矩阵：

1. 计算出当前矩阵的反矩阵。即 0 变成 1，1 变成 0。
2. 将当前矩阵放在左上角和右下角，将反矩阵放在左下角和右上角。
3. 将得到的矩阵作为当前矩阵，回到步骤 1 并不断重复。

我们将列从上到下标号为 1 到 ∞，将行从左到右标号为 1 到 ∞。接下来进行 q 次询问，每次询问子矩阵 (x_1, y_1, x_2, y_2) 的元素之和。

数据范围：$1 \le n, m \le 1000$，$1 \le q \le 10^5$，$1 \le x_1 \le x_2 \le 10^9$，$1 \le y_1 \le y_2 \le 10^9$。

Siyuan（https://blog.orzsiyuan.com/author/1/） 2019 年 06 月 29 日

「Codeforces 1148F」Foo Fighters (https://blog.orzsiyuan.com/archives/Codeforces-1148F-Foo-Fighters/)

> 题目链接：Codeforces 1148F (https://codeforc.es/contest/1148/problem/F)

你有 n 个物品，每个物品有两个属性 val_i 和 $mask_i$。保证最初 val_i 的和非零。

你想要选择一个正整数 s 并将所有物品的 val_i 进行修改，第 i 个物品的 val_i 通过如下方法修改：

- 将 $mask_i$ 和 s 在二进制下考虑。
- 计算 s AND $mask_i$ 的值。
- 如果 s AND $mask_i$ 的值中有奇数个 1，那么将 val_i 替换为 $-val_i$；否则不进行修改。

你需要找到这样一个整数 s，使得所有物品 val_i 的和相对最初的和正负号相反（不允许为 0）。但是和的绝对值可以是任意的。

数据范围：$1 \le n \le 3 \times 10^5$，$-10^9 \le val_i \le 10^9$，$1 \le mask_i, s < 2^{62}$。

Siyuan (https://blog.orzsiyuan.com/author/1/) 2019 年 06 月 03 日

「ARC 103B」Robots Arms (https://blog.orzsiyuan.com/archives/ARC-103B-Robots-Arms/)

> 题目链接：ARC 103B (https://atcoder.jp/contests/arc103/tasks/arc103_b)

Snuke 正在向他的工厂介绍一款机械臂：

- 机械臂由 m 个部分和 $m+1$ 个关节组成，关节标号为 0 到 m。第 i 个部分连着第 $i-1$ 和 i 个关节。第 i 个部分的长度为 d_i。
- 对于每个部分，可以单独指定其动作。现在有 4 种模式：L、R、D 和 U。如果我么把工厂视为坐标平面，那么关节 i 的位置将通过如下方法确定（我么将它的坐标表示为 (x_i, y_i)）：
  - $(x_0, y_0) = (0, 0)$。
  - 如果第 i 个模式为 L，那么 $(x_i, y_i) = (x_{i-1} - d_i, y_{i-1})$。
  - 如果第 i 个模式为 R，那么 $(x_i, y_i) = (x_{i-1} + d_i, y_{i-1})$。
  - 如果第 i 个模式为 D，那么 $(x_i, y_i) = (x_{i-1}, y_{i-1} - d_i)$。
  - 如果第 i 个模式为 U，那么 $(x_i, y_i) = (x_{i-1}, y_{i-1} + d_i)$。

Snuke 想要引入一种机械臂，以便通过正确的指定模式，使得关节 m 可以到达所有的 n 个点 $(X_1, Y_1), (X_2, Y_2), \cdots, (X_n, Y_n)$。请判断这是否可行。如果可行，那么请你构造一个满足条件的机械臂，并分别给出到达 n 个点的模式方案。

在你构造出的方案中，必须满足 $1 \le m \le 40$，$1 \le d_i \le 10^{12}$ 。

数据范围：$1 \le n \le 1000$，$-10^9 \le X_i, Y_i \le 10^9$。

Siyuan (https://blog.orzsiyuan.com/author/1/) 2019 年 04 月 16 日

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