Problem 1659: Maximize Grid Happiness

Problem Information

Difficulty: Hard
Acceptance Rate: 40.41%
Paid Only: No
Tags: Dynamic Programming, Bit Manipulation, Memoization, Bitmask

Problem Description

You are given four integers, `m`, `n`, `introvertsCount`, and `extrovertsCount`. You have an `m x n` grid, and there are two types of people: introverts and extroverts. There are `introvertsCount` introverts and `extrovertsCount` extroverts.

You should decide how many people you want to live in the grid and assign each of them one grid cell. Note that you **do not** have to have all the people living in the grid.

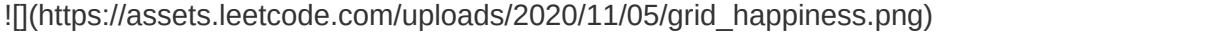
The **happiness** of each person is calculated as follows:

* Introverts **start** with `120` happiness and **lose** `30` happiness for each neighbor (introvert or extrovert). * Extroverts **start** with `40` happiness and **gain** `20` happiness for each neighbor (introvert or extrovert).

Neighbors live in the directly adjacent cells north, east, south, and west of a person's cell.

The **grid happiness** is the **sum** of each person's happiness. Return _the**maximum possible grid happiness**._

Example 1:



Input: m = 2, n = 3, introvertsCount = 1, extrovertsCount = 2 **Output:** 240
Explanation: Assume the grid is 1-indexed with coordinates (row, column). We can put the introvert in cell (1,1) and put the extroverts in cells (1,3) and (2,3). - Introvert at (1,1) happiness: 120 (starting happiness) - (0 * 30) (0 neighbors) = 120 - Extrovert at (1,3)

happiness: 40 (starting happiness) + (1 * 20) (1 neighbor) = 60 - Extrovert at (2,3) happiness: 40 (starting happiness) + (1 * 20) (1 neighbor) = 60 The grid happiness is 120 + 60 + 60 = 240. The above figure shows the grid in this example with each person's happiness. The introvert stays in the light green cell while the extroverts live on the light purple cells.

Example 2:

Input: m = 3, n = 1, introvertsCount = 2, extrovertsCount = 1 **Output:** 260 **Explanation:** Place the two introverts in (1,1) and (3,1) and the extrovert at (2,1). - Introvert at (1,1) happiness: 120 (starting happiness) - (1 * 30) (1 neighbor) = 90 - Extrovert at (2,1) happiness: 40 (starting happiness) + (2 * 20) (2 neighbors) = 80 - Introvert at (3,1) happiness: 120 (starting happiness) - (1 * 30) (1 neighbor) = 90 The grid happiness is 90 + 80 + 90 = 260.

Example 3:

Input: m = 2, n = 2, introvertsCount = 4, extrovertsCount = 0 **Output:** 240

Constraints:

* `1 <= m, n <= 5` * `0 <= introvertsCount, extrovertsCount <= min(m * n, 6)`

Code Snippets

C++:

```
class Solution {
public:
int getMaxGridHappiness(int m, int n, int introvertsCount, int
extrovertsCount) {

}
};
```

Java:

```
class Solution {
public int getMaxGridHappiness(int m, int n, int introvertsCount, int
extrovertsCount) {

}
```

```
}
```

Python3:

```
class Solution:
def getMaxGridHappiness(self, m: int, n: int, introvertsCount: int,
extrovertsCount: int) -> int:
```