Problem 2312: Selling Pieces of Wood

Problem Information

Difficulty: Hard
Acceptance Rate: 52.31%
Paid Only: No
Tags: Array, Dynamic Programming, Memoization

Problem Description

You are given two integers `m` and `n` that represent the height and width of a rectangular piece of wood. You are also given a 2D integer array `prices`, where `prices[i] = [hi, wi, pricei]` indicates you can sell a rectangular piece of wood of height `hi` and width `wi` for `pricei` dollars.

To cut a piece of wood, you must make a vertical or horizontal cut across the **entire** height or width of the piece to split it into two smaller pieces. After cutting a piece of wood into some number of smaller pieces, you can sell pieces according to `prices`. You may sell multiple pieces of the same shape, and you do not have to sell all the shapes. The grain of the wood makes a difference, so you **cannot** rotate a piece to swap its height and width.

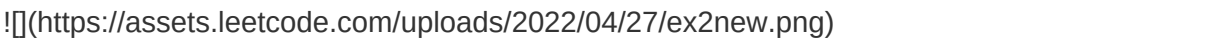
Return _the**maximum** money you can earn after cutting an _`m x n` _piece of wood_.

Note that you can cut the piece of wood as many times as you want.

Example 1:

Input: m = 3, n = 5, prices = [[1,4,2],[2,2,7],[2,1,3]] **Output:** 19 **Explanation:** The diagram above shows a possible scenario. It consists of: - 2 pieces of wood shaped 2 x 2, selling for a price of 2 * 7 = 14. - 1 piece of wood shaped 2 x 1, selling for a price of 1 * 3 = 3. - 1 piece of wood shaped 1 x 4, selling for a price of 1 * 2 = 2. This obtains a total of 14 + 3 + 2 = 19 money earned. It can be shown that 19 is the maximum amount of money that can be earned.

Example 2:



Input: m = 4, n = 6, prices = [[3,2,10],[1,4,2],[4,1,3]] **Output:** 32 **Explanation:** The diagram above shows a possible scenario. It consists of: - 3 pieces of wood shaped 3 x 2, selling for a price of 3 * 10 = 30. - 1 piece of wood shaped 1 x 4, selling for a price of 1 * 2 = 2. This obtains a total of 30 + 2 = 32 money earned. It can be shown that 32 is the maximum amount of money that can be earned. Notice that we cannot rotate the 1 x 4 piece of wood to obtain a 4 x 1 piece of wood.

Constraints:

* `1 <= m, n <= 200` * `1 <= prices.length <= 2 * 104` * `prices[i].length == 3` * `1 <= hi <= m` * `1 <= wi <= n` * `1 <= pricei <= 106` * All the shapes of wood `(hi, wi)` are pairwise **distinct**.

Code Snippets

C++:

```
class Solution {
public:
long long sellingWood(int m, int n, vector<vector<int>>& prices) {

}
};
```

Java:

```
class Solution {
public long sellingWood(int m, int n, int[][] prices) {

}
}
```

Python3:

```
class Solution:
def sellingWood(self, m: int, n: int, prices: List[List[int]]) -> int:
```