

# Problem 2813: Maximum Elegance of a K-Length Subsequence

## Problem Information

**Difficulty:** Hard

**Acceptance Rate:** 28.32%

**Paid Only:** No

**Tags:** Array, Hash Table, Stack, Greedy, Sorting, Heap (Priority Queue)

## Problem Description

You are given a \*\*0-indexed\*\* 2D integer array `items` of length `n` and an integer `k`.

`items[i] = [profit<sub>i</sub>, category<sub>i</sub>]` , where `profit<sub>i</sub>` and `category<sub>i</sub>` denote the profit and category of the `ith` item respectively.

Let's define the \*\*elegance\*\* of a \*\*subsequence\*\* of `items` as `total\_profit + distinct\_categories2` , where `total\_profit` is the sum of all profits in the subsequence, and `distinct\_categories` is the number of \*\*distinct\*\* categories from all the categories in the selected subsequence.

Your task is to find the \*\*maximum elegance\*\* from all subsequences of size `k` in `items`.

Return \_an integer denoting the maximum elegance of a subsequence of\_ `items` \_with size exactly\_ `k` .

**Note:** A subsequence of an array is a new array generated from the original array by deleting some elements (possibly none) without changing the remaining elements' relative order.

**Example 1:**

**Input:** items = [[3,2],[5,1],[10,1]], k = 2 **Output:** 17 **Explanation:** In this example, we have to select a subsequence of size 2. We can select items[0] = [3,2] and items[2] = [10,1]. The total profit in this subsequence is 3 + 10 = 13, and the subsequence contains 2 distinct categories [2,1]. Hence, the elegance is 13 + 22 = 17, and we can show that it is the

maximum achievable elegance.

**\*\*Example 2:\*\***

**\*\*Input:\*\*** items = [[3,1],[3,1],[2,2],[5,3]], k = 3 **\*\*Output:\*\*** 19 **\*\*Explanation:\*\*** In this example, we have to select a subsequence of size 3. We can select items[0] = [3,1], items[2] = [2,2], and items[3] = [5,3]. The total profit in this subsequence is  $3 + 2 + 5 = 10$ , and the subsequence contains 3 distinct categories [1,2,3]. Hence, the elegance is  $10 + 32 = 19$ , and we can show that it is the maximum achievable elegance.

**\*\*Example 3:\*\***

**\*\*Input:\*\*** items = [[1,1],[2,1],[3,1]], k = 3 **\*\*Output:\*\*** 7 **\*\*Explanation:\*\*** In this example, we have to select a subsequence of size 3. We should select all the items. The total profit will be  $1 + 2 + 3 = 6$ , and the subsequence contains 1 distinct category [1]. Hence, the maximum elegance is  $6 + 12 = 7$ .

**\*\*Constraints:\*\***

```
* `1 <= items.length == n <= 105` * `items[i].length == 2` * `items[i][0] == profiti` * `items[i][1] == categoryi` * `1 <= profiti <= 109` * `1 <= categoryi <= n` * `1 <= k <= n`
```

## Code Snippets

**C++:**

```
class Solution {
public:
    long long findMaximumElegance(vector<vector<int>>& items, int k) {
        }
};
```

**Java:**

```
class Solution {
public long findMaximumElegance(int[][] items, int k) {
        }
}
```

**Python3:**

```
class Solution:  
    def findMaximumElegance(self, items: List[List[int]], k: int) -> int:
```