**Recruiting Test - Continuous Improvement**

The following test aims to measure and give us insights about the three main skills you’ll need as a Continuous Improvement Analyst:

* Data management
* Problem solving
* Coding

At Merqueo, our main objective is to become the largest Latin American Online Supermarket, and to reach that goal, the company needs people like you to give us tools to take informed and data-driven decisions, thus, minimizing risk and costs and maximizing our profits. Given that, you’ll have **two days** to solve a problem and finally, summarize the most important results.

One of the warehouse chiefs requires your help on a very important matter: How many **baskets and cold bags** do we need in each of the orders created to be attended by Merqueo?

Today, orders are not being packed in a very efficient way, thus, the warehouse chief asked you to create an algorithm that can solve for any set of products how many baskets and cold bags are needed to correctly pack an order.

Each order contains different products that have diverse characteristics.

Each of the products has:

* Dimensions (height, length, width) in centimeters
* Weight in grams
* A category that determines if the product can be mixed with other products
  + Food
  + Toilet
  + Pets
* A storage type that determines the type of package that will be used for the product
  + Dry
  + Refrigerated
  + Frozen

There are some constraints associated with the type of package to be used when packing a product:

* All **Dry products** must be packed in a baskets
* All **Refrigerated and Frozen products** must be packed in a cold bag
* Products cannot be mixed if their categories are different, for example, **a food product cannot be packed in the same basket that was used to pack a pet product**, and also, **a toilet product cannot be packed in the same basket that was used to pack a pet product**, and so on.
* The baskets have the following characteristics:
  + Length: 50 centimeters
  + Width: 40 centimeters
  + Height: 60 centimeters
  + Total weight that it can resit: 25 kilograms
* The cold bags have the following characteristics:
  + Length: 23 centimeters
  + Width: 37 centimeters
  + Height: 18 centimeters
  + Total weight that it can resit: 5 kilograms

To solve this problem, someone from the data team sent you the file “dataset.xlsx”, which contains multiple sheets. A description for each one of these sheets is given below:

* orders: it contains the orders that need the calculation of baskets and cold bags. Also, you can see when the order must be delivered and which warehouse received the order.
* order\_products: contains what products and how many units of it were on an order from the sheet “orders”.
* store\_products: contains information about the storage of the products and a marketing category.
* products: contains information about the products, its dimensions and weight, as well as their names and the can\_mix category.

Please solve this **bin packing** problem in any programming language of your preference and report your results in the following format:

| **order\_id** | **baskets** | **cold\_bags** |
| --- | --- | --- |
| 1 | 100 | 0 |
| 2 | 100 | 20 |
| ... | ... | ... |

Finally, calculate any statistics that you may consider relevant with the provided data and the results. Remember that efficiency does not necessarily mean that it must be optimal.

You are going to be evaluated using the following matrix:

|  | **Description** | **Value** | **Score** |
| --- | --- | --- | --- |
| Data Management | Extracts, manipulates and cleans the data using a programming language. | 20% |  |
| Model Efficiency | How the proposed model compares to the real solution. | 30% |  |
| Coding | Presents a legible, efficient and well commented script. | 30% |  |
| Presentation | Presents an executive report (power point, word, markdown, notebook, etc) with the summary of the results in an organized way. | 20% |  |