Problem Analysis and Interpretations

Context

A supermarket would like to have a checkout system that generates a Receipt given a list of product items chosen from a customer.

The supermarket would be filled with multiple types of products the customer can choose from. The supermarket also offers some discounting rules that allow the customer to benefit from free items when bought with certain conditions. Some of the products are eligible for the discounting deals.

The produced receipt should properly show the initial chosen items, the discounted items, and the total amount to be paid by the customer.

Discounting Rules

The complexity of the problems arises when needing to decide how to apply the discounting rules on the eligible items; two rules can be applied:

1. Buy 3 identical items and pay for 2.
2. Buy 3 (in a set of items) and the cheapest is free.

Given the two rules, multiple decisions and interpretation can be done; there are multiple ways to apply these rules depending on the order of which they are applied or on the way to group up the items. Therefore, some questions can be asked that can have different answers leading to different outcomes.

- Question 1: Can a product be eligible for one of the two rules only? Or should it be both or none at the same time?

In this case both answers are valid use cases, and it would be a decision to be taken from the supermarket owner depending on the exact requirement, however for the sake of the exercise, it was decided that a product either applies to both rules or not.

- Question 2: Can an item be considered in both rules during the checkout?

In order to be aligned with how a real supermarket operates, it would be more natural for an item to only apply to one rule at a time.

- Question 3: In the second rule, should all the chosen items be different?

Here that would be a decision to be taken from the supermarket owner, it will affect the way we group the sets of items, for example if we have 1 item of Product1 and 2 items of Product2, should that set be eligible for the discount? It was decided that the items do not necessarily need to be different in order to apply for the rule, therefore in the example mentioned above, the set of items would be the 3 items, and the cheapest would be free.

- Question 4: Is there any order in which the rules should be applied on the list of products?

Here the issue is a bit more sensible. Let's say that the order does not matter; in case the second rule is always applied first, that would mean that the first rule will never have any effect, since the group of 3

items will be consumed by the second being applied on all of the possibilities. Therefore, for the problem to be more consistent, it was decided that the order should actually matter, and the first rule should be applied first when possible.

- Question 5: When grouping the items in sets for the second rule to be applied, who should be favored; the supermarket or the customer?

Whenever we have more than 3 items, there will be multiple ways to group up these items into a set, meaning that the cheapest within the set can vary. Given 4 different products with increasing prices, P1 with a price of 1, P2 with a price of 2, P3 with a price of 3 and P4 with a price of 4, selecting one item of each of the 4 products, group the cheapest of 3 items would result in the overall cheapest item to be free (P1), whereas grouping the 3 most expensive items would mean that item of Product P2 would be free. The decision would also need to be done by the supermarket owner on that matter since both favoring the customer or the supermarket could be a valid strategy for the business. However, for this exercise, it was decided that the supermarket would be favored, grouping up the items so that the cheapest available item would be free when applying the second rule.

Overall interpretations and decisions:

- A product is either eligible for both discounting rules or none.
- An item can only be considered in one of the two rules during checkout.
- For the second rule, the items can be of the same product and still apply for the rule.
- First rule should be applied first if valid.
- The supermarket should be favored when choosing the cheapest item to be free when there is a choice to be made.

The system is designed to easily adapt to changes to these interpretations as well as being easily scalable for additional discounting rules.

Receipt Details

Since no details were mentioned on how to present the receipt, the following details were decided;

The receipt is divided into 3 sections:

- A section containing all the chosen products and their quantity, regardless of the discounting rules, with the undiscounted total.
- A second section containing all the discounted products and their quantity, with the discounted total.
- The overall total.

The first 2 sections would contain a line for each product showing the product name, the product unit price, the number of items chosen for that product and the subtotal of that product.