**Final Insights**

1. **Clusters Based on Total Items**:
   * The x-axis represents the total number of items purchased by customers, and the color gradient represents different clusters.
   * Customers who purchased fewer items (1 to 2 items) seem to belong mostly to clusters with lower labels (likely clusters 0 or 1), which might indicate they are less engaged or occasional buyers.
   * As the number of total items increases (closer to 6-10 items), customers tend to belong to clusters with higher labels (likely clusters 2 or 3). These might represent more frequent or higher-value customers.
2. **Cluster Spread Across Purchases**:
   * Some clusters span a wide range of total items. For example, you can see colors representing different clusters across all item ranges, indicating that clusters are not solely determined by the number of items purchased.
   * However, the distinct concentration of certain colors (clusters) suggests that some clusters tend to buy more or fewer items.
3. **Customer Segmentation Patterns**:
   * Higher item purchases might correlate with higher spending or greater customer loyalty.
   * Lower item purchases may indicate casual buyers or those who engage only with specific promotions.

**Possible Actions:**

* **Targeting Frequent Shoppers**: Customers in the clusters associated with higher total items might be valuable for loyalty programs or premium services. Promotions or rewards aimed at these clusters could enhance their engagement further.
* **Engagement with Low-Purchasing Customers**: Customers who purchase fewer items (represented in lower clusters) might benefit from more personalized marketing efforts (e.g., discounts, and promotions on frequently bought items) to encourage higher spending.