4.10: Coding Etiquette & Excel Reporting [Python] Key Questions - Marta Majer
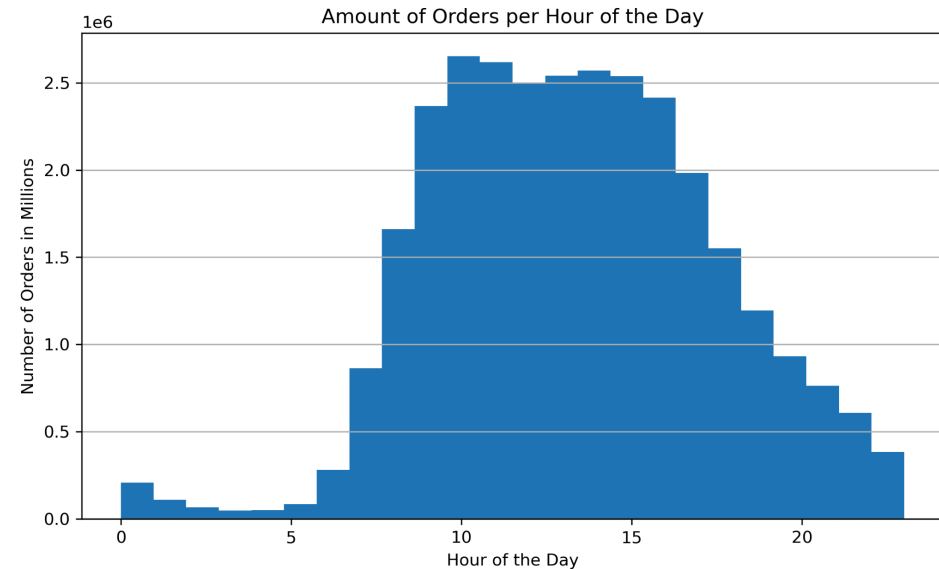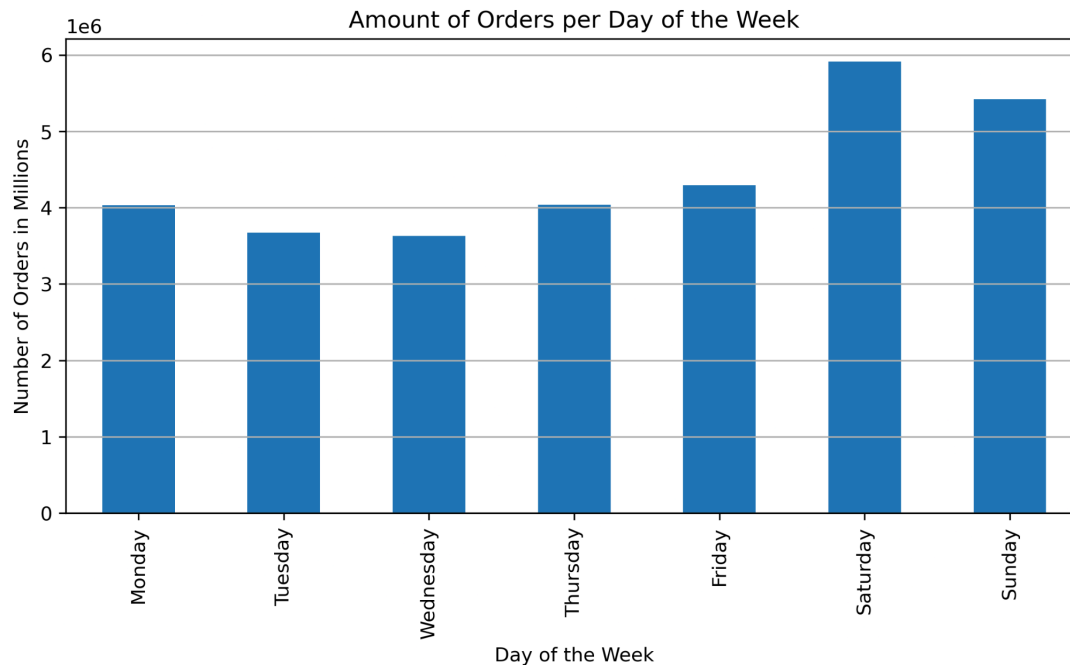
1. The sales team needs to know what the busiest days of the week and hours of the day are (i.e., the days and times with the most orders) in order to schedule ads at times when there are fewer orders.


- Busiest Hours: The peak hours for orders are between 10 AM and 3 PM, with the highest number of orders around noon.
- Least Busy Hours: The early morning hours, particularly between midnight and 6 AM, have the fewest orders.
- Trend: Orders gradually increase from early morning, peak around midday, and then decrease towards the evening.
- Busiest Days: Saturday has the highest number of orders, followed by Sunday.
- Least Busy Days: Wednesday has the fewest orders.
- Trend: Orders are relatively consistent from Monday to Friday, with a noticeable increase over the weekend.
- Insight for Scheduling Ads: To maximize ad effectiveness, consider scheduling ads during the early morning hours (midnight to 6 AM) and on Tuesdays, when order volumes are lower.

2. They also want to know whether there are particular times of the day when people spend the most money, as this might inform the type of products they advertise at these times.
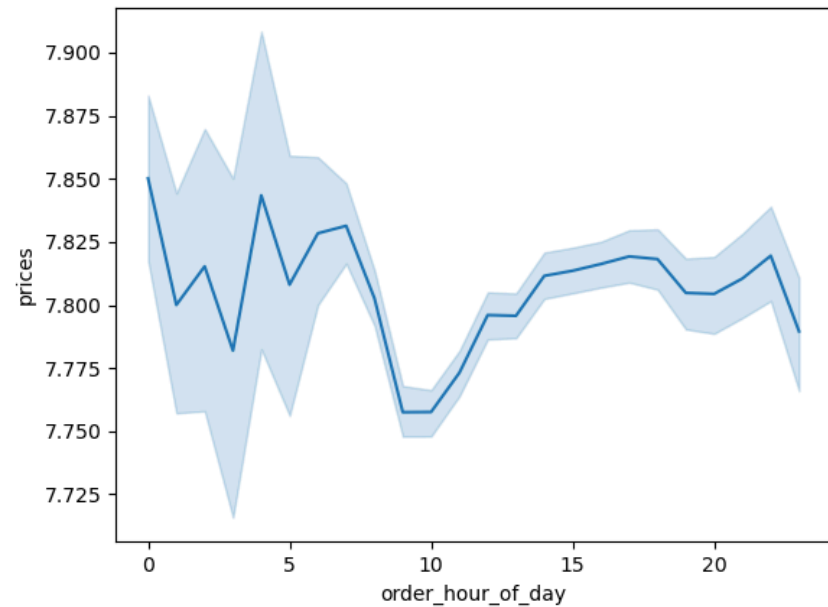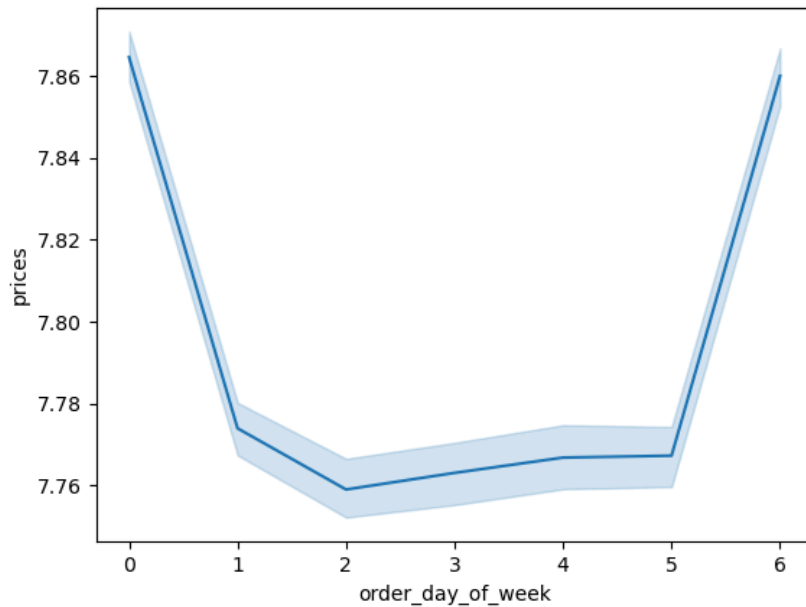
- Prices fluctuate within a narrow range of about $7.75 to $7.90 throughout the day and week.
- Slightly higher prices are observed in early morning hours and evenings.
- Weekends, especially Saturdays, show marginally higher prices.

- Highest Spending Days: Friday (day nr 6) and Saturday (day nr 0) have the highest average order prices.
- Lowest Spending Days: Monday (day nr 2) has the lowest average order prices.
- Highest Spending Hours: The highest average order prices occur in the night and early morning as well as evening hours.
- Lowest Spending Hours: The lowest average order prices are observed around 10 AM.
- Trend: Spending tends to increase in the evening, suggesting that people are willing to spend more during these hours.

- **Insight for Product Advertising**: To maximize revenue, consider advertising higher-priced or premium products during the evening hours (6 PM to 9 PM) and on Fridays and Saturdays when spending is highest.

3. Instacart has a lot of products with different price tags. Marketing and sales want to use simpler price range groupings to help direct their efforts.

Distribution of Price Ranges (USD) and Their Frequency
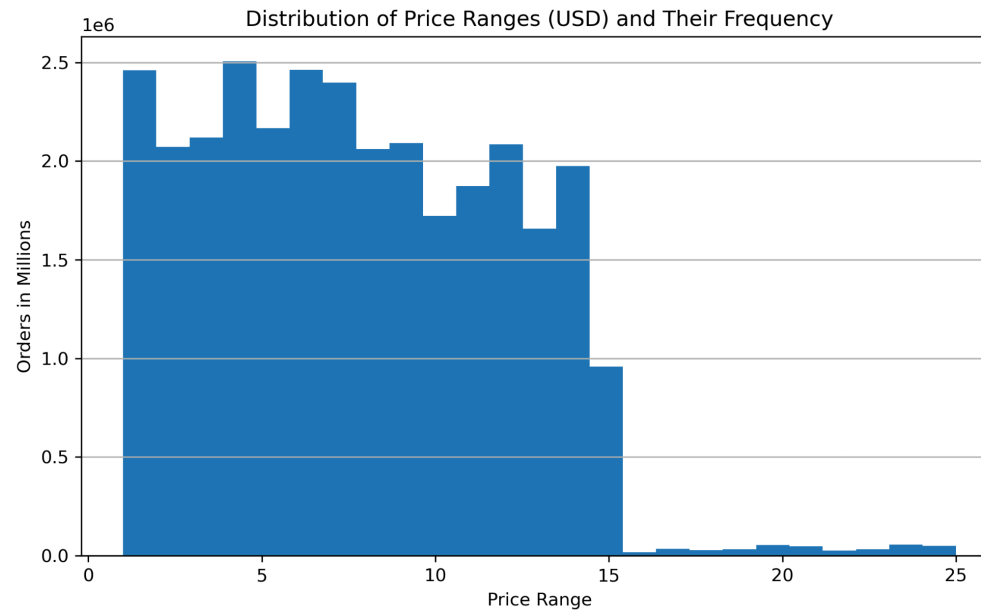
Price Sensitivity: Customers show a strong preference for lower-priced items, with the obvious majority of orders falling under $15.
Volume vs. Value: While lower-priced items dominate in terms of order volume, there's potential for higher revenue in mid-range and premium segments despite lower order counts.
Price Thresholds: There appears to be a significant psychological price threshold around $15, after which order frequency drops sharply.

Diverse Product Range: The long tail suggests that Instacart offers a wide range of products, including some premium-priced items, though these are ordered less frequently.

Insight for Product Advertising:

- Create product bundles that combine items from different price ranges to increase average order value. Example: Pair a popular low-cost item with a complementary mid-range product.
- Implement tiered rewards that incentivize purchases across all price ranges. Offer special points or discounts for trying products in higher price brackets.
- Ensure high visibility of products in the $0-$15 range to drive traffic and order volume. Strategically showcase mid-range and premium products alongside budget options to encourage discovery.

4. Are there certain types of products that are more popular than others? The marketing and sales teams want to know which departments have the highest frequency of product orders.

Order Count per Department
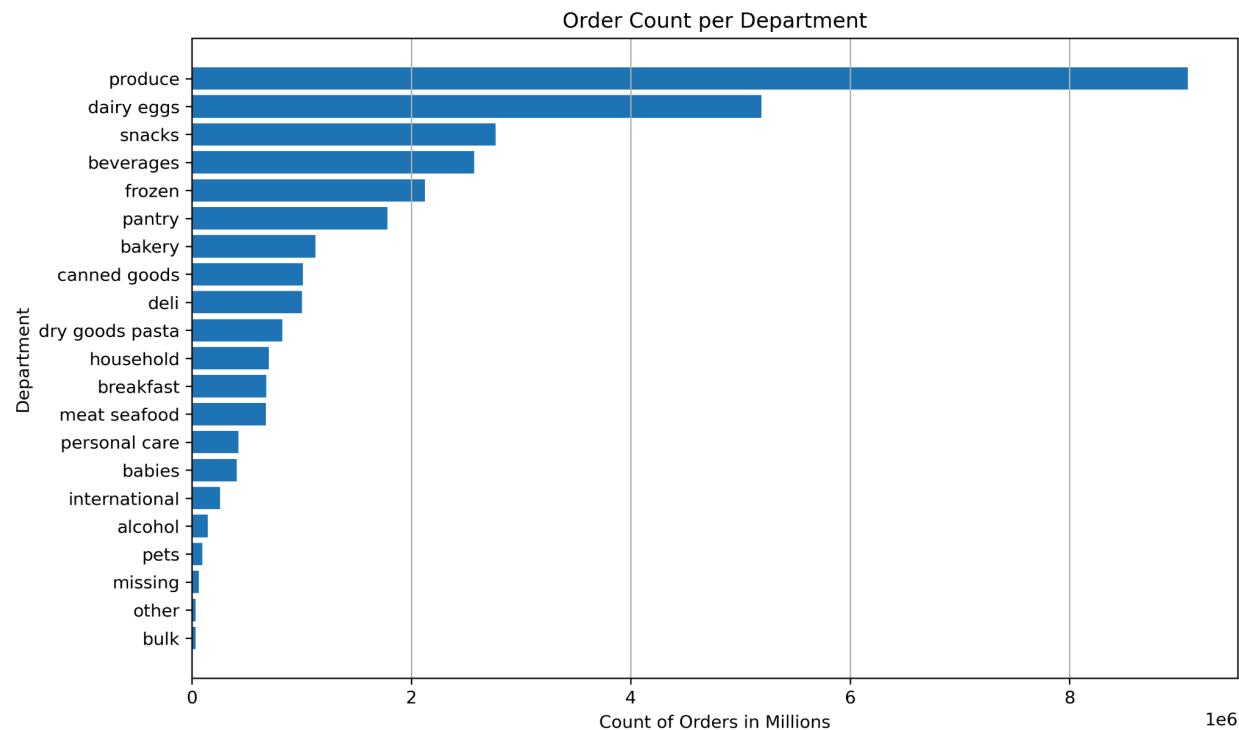
Top Departments: Produce and Dairy & Eggs are the most popular departments, indicating a strong customer preference for fresh and essential items.
Middle Tier:

Departments like Snacks, Beverages, Frozen, and Pantry represent a middle tier in purchasing frequency, indicating that while they are frequently bought, they are not as dominant as the top categories. Unlike the largest category (Fresh Products), these items can be stored for longer, suggesting that consumers are purchasing items they want to avoid spoiling.

Insight for Product Advertising:

- Focus on Top Departments: Enhance promotions and product visibility in Produce and Dairy & Eggs to capitalize on their popularity.
- Cross-Promotions: Consider bundling items from the middle tier with top department products to increase sales.
- Niche Marketing: Develop targeted campaigns for specialty categories to reach specific customer segments.
- Data Quality: Address the "missing" category to ensure all products are correctly classified, improving data accuracy for future analysis.

The marketing and sales teams are particularly interested in the different types of customers in their system and how their ordering behaviors differ. For example:

➜ **loyalty_flag**	➜ **spending_flag**	➜ **frequency_flag**
Loyal Customers: Made more than 40 orders.	High Spenders: Average purchase price is 10 or more.	Non-Frequent Customers: Order every more than 20 days.
Regular Customers: Made 11 to 40 orders.	——	Regular Customers: Order every 11 to 20 days.
New Customers: Made 10 orders or fewer.	Low Spenders: Average purchase price is less than 10.	Frequent Customers: Order every 10 days or fewer.

5. Customer income group, age group and part of the day ordering habits.
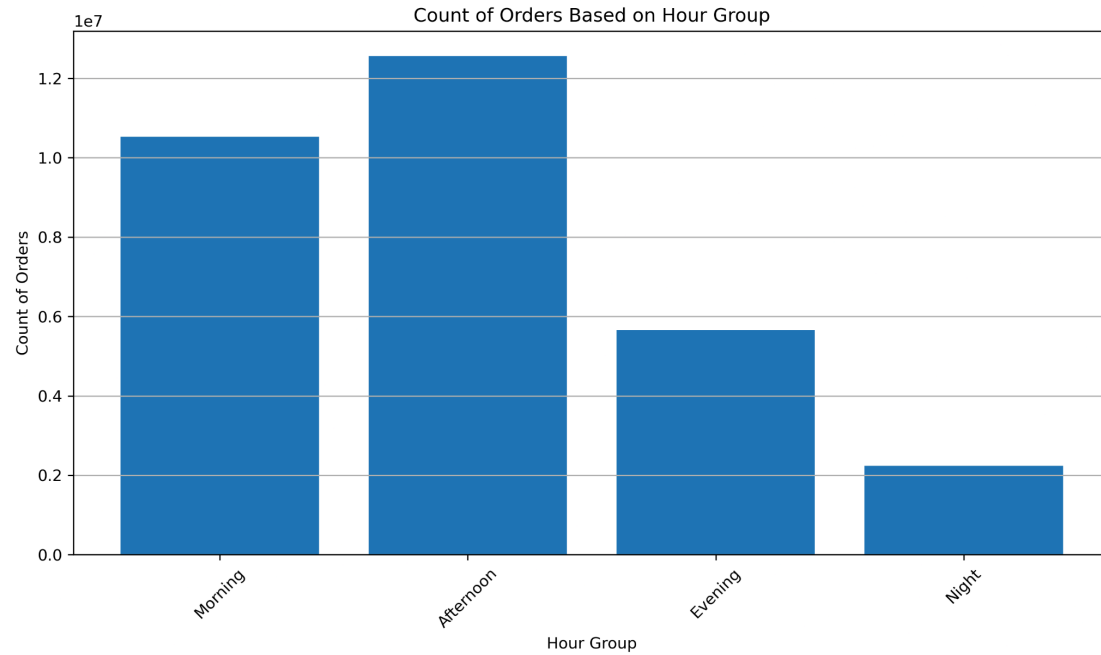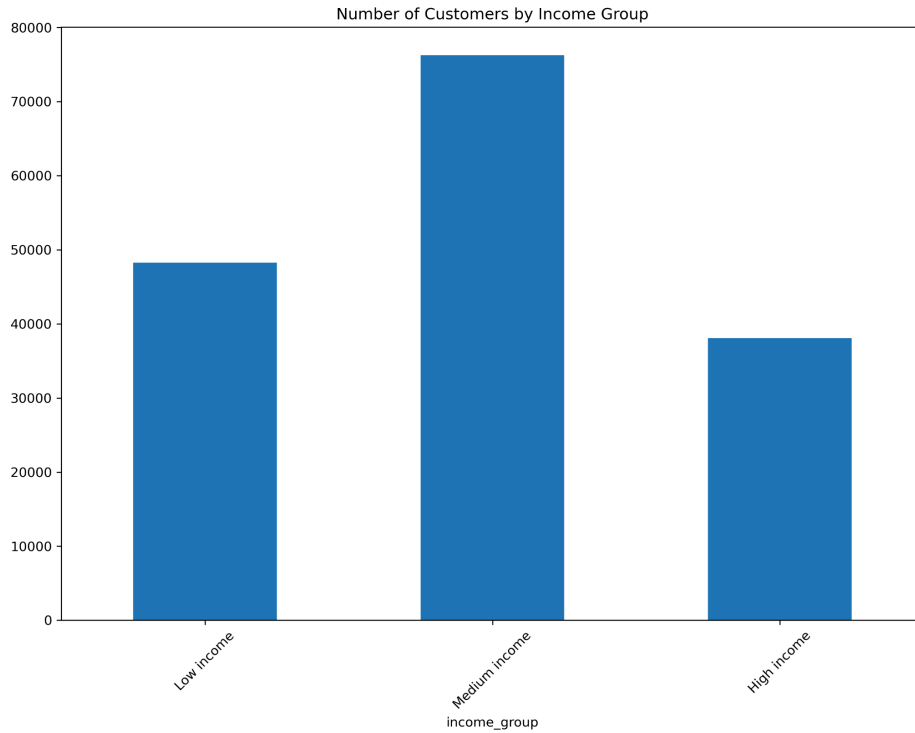
Unique Customers by Income Group: The distribution indicates that medium-income groups have the highest number of unique customers, suggesting they are the most engaged demographic.

Count of Orders Based on Hour Group: The distribution shows peak ordering times during late morning to early afternoon, indicating that most orders are placed between these hours.

Count of Orders by Hour Group and Age Group (left) and Count of Orders by Hour Group and Income Group (right)
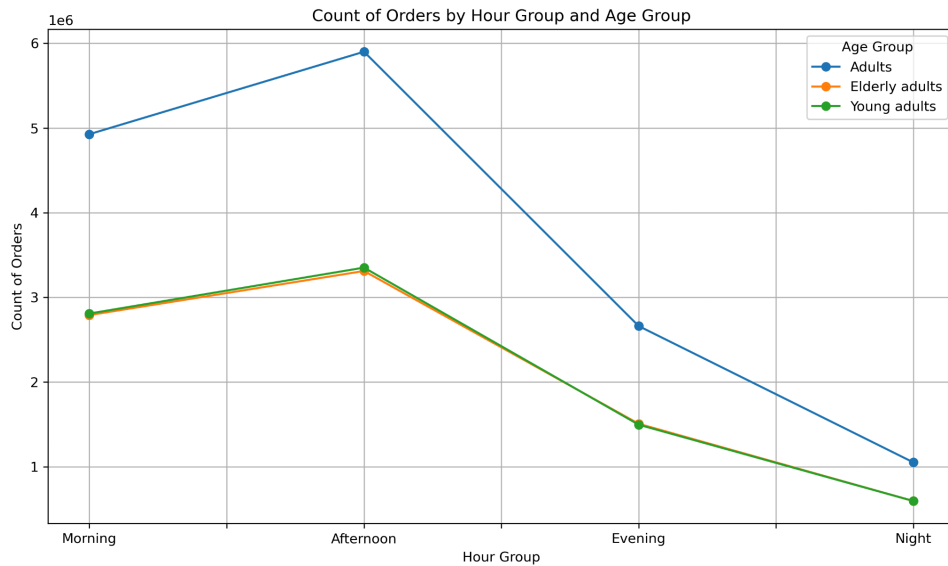
Count of Orders by Hour Group and Age Group

Adults: They place the most orders, especially in the afternoon, with a noticeable drop in the evening and night.

Young Adults and Elderly Adults: These groups have similar ordering patterns, with a peak in the afternoon and fewer orders in the evening and night.
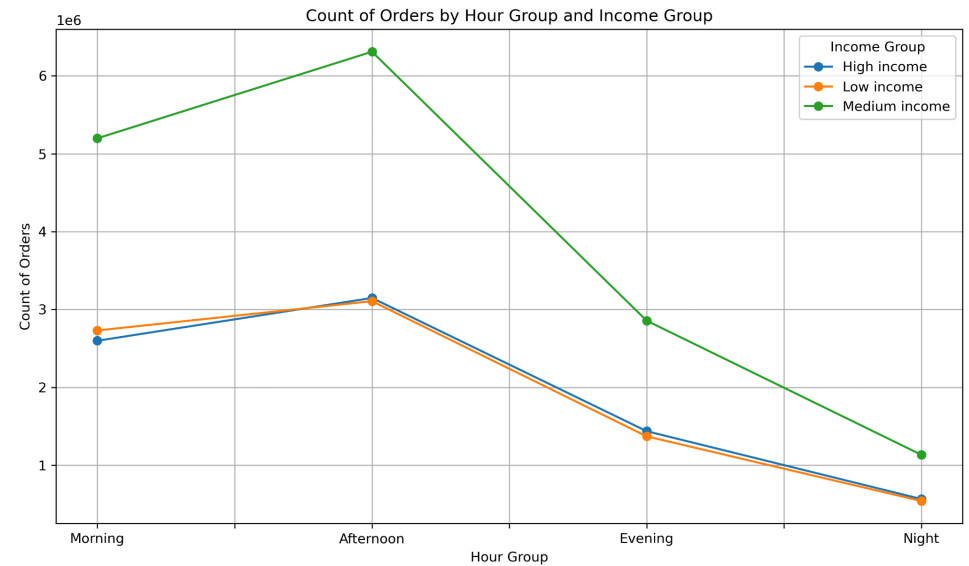
Count of Orders by Hour Group and Income Group

Medium Income: This group consistently places the most orders across all time periods, with a peak in the afternoon.

High and Low Income: Both groups have similar patterns, with a slight increase in orders in the afternoon and a decline in the evening and night.

General Observations

Afternoon Peak: Both income and age groups show a peak in orders during the afternoon.

Evening Decline: There is a consistent decline in orders during the evening and night across all groups.

These insights suggest that marketing efforts could be also focused on the afternoon peak times, especially targeting medium-income adults.

6. Family dynamics, and age group as customer profiles.
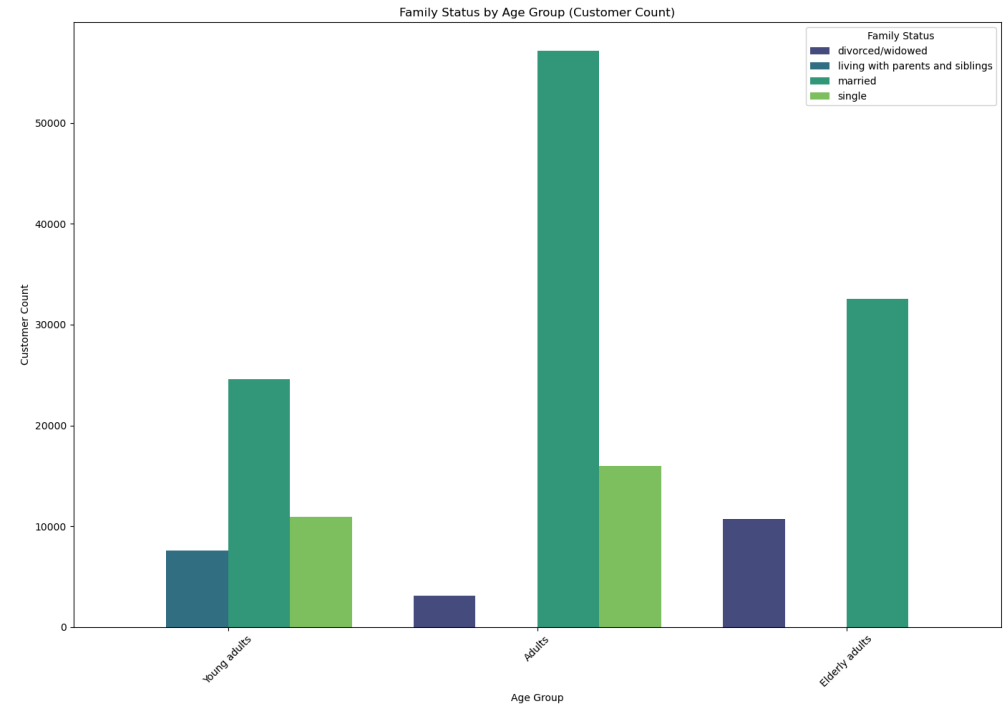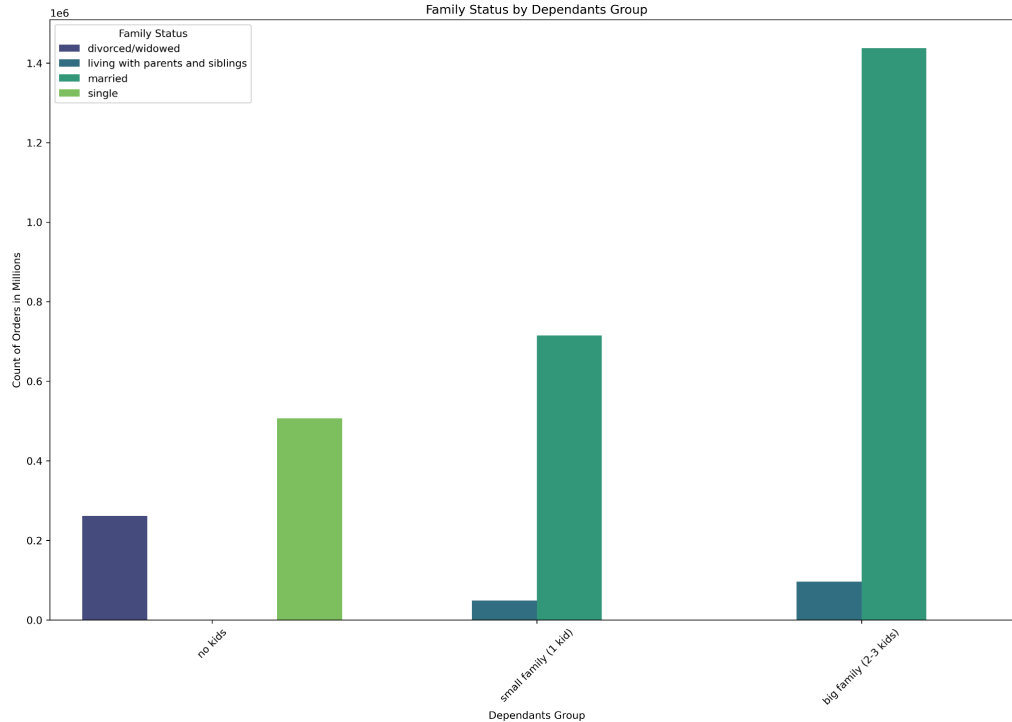
Married Adults: The Cornerstone Demographic
Dominate the customer base, especially in the "big family" (2-3 kids) and "small family" (1 kid) categories. Represent the most active user group across all age brackets. Likely to have the highest demand for family-sized groceries and household essentials.

Singles and Young Adults: The Independent Shoppers
Predominantly fall into the "no kids" category. Young adults are more likely to be single or living with parents and siblings. May prefer smaller portions, convenience items, or ready-to-eat meals.

Elderly Adults: A Significant Niche
Mostly married, with a notable presence in the divorced/widowed category. Less likely to have dependents at home. May have unique dietary needs or preferences.

Age and Family Status Correlation

Adults (middle-aged) form the largest customer segment across all family statuses. Young adults show a higher tendency towards being single or living with family. Elderly adults are primarily married or divorced/widowed.

Dependents and Shopping Behavior

Families with dependents (both small and big families) show higher activity levels.
The presence of children in a household appears to increase Instacart usage.

These insights paint a picture of Instacart's diverse customer base, highlighting the importance of tailored approaches for different family structures and age groups. The data suggests that marketing efforts and product recommendations could be most effective when customized to the specific needs of married adults with children, while also catering to the unique requirements of singles, young adults, and elderly customers.

7. Department of products. What customers order depending on their demographics.

Count of Orders in Millions by Age Group and Department Group
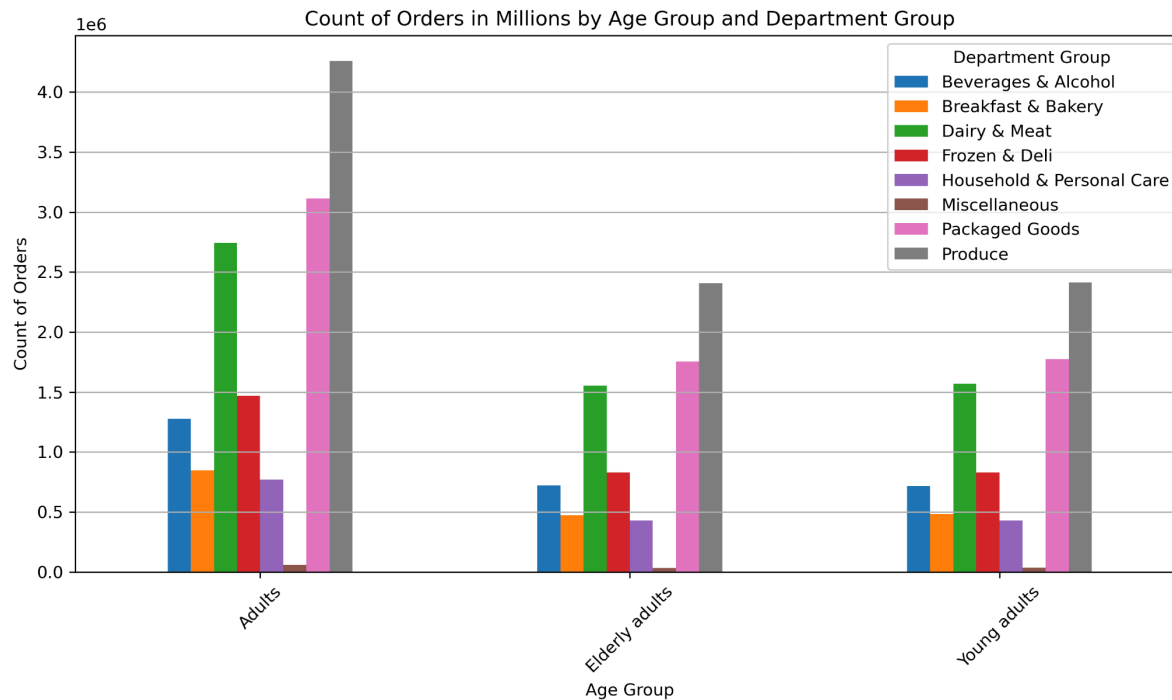
Age Group and Department Group

Adults: Highest orders in Produce, followed by Packaged Goods and Dairy & Meat.

Elderly Adults: Similar pattern to adults, with Produce leading, but a noticeable preference for Packaged Goods.

Young Adults: Also favor Produce, but with a higher proportion of Dairy & Meat compared to other age groups.
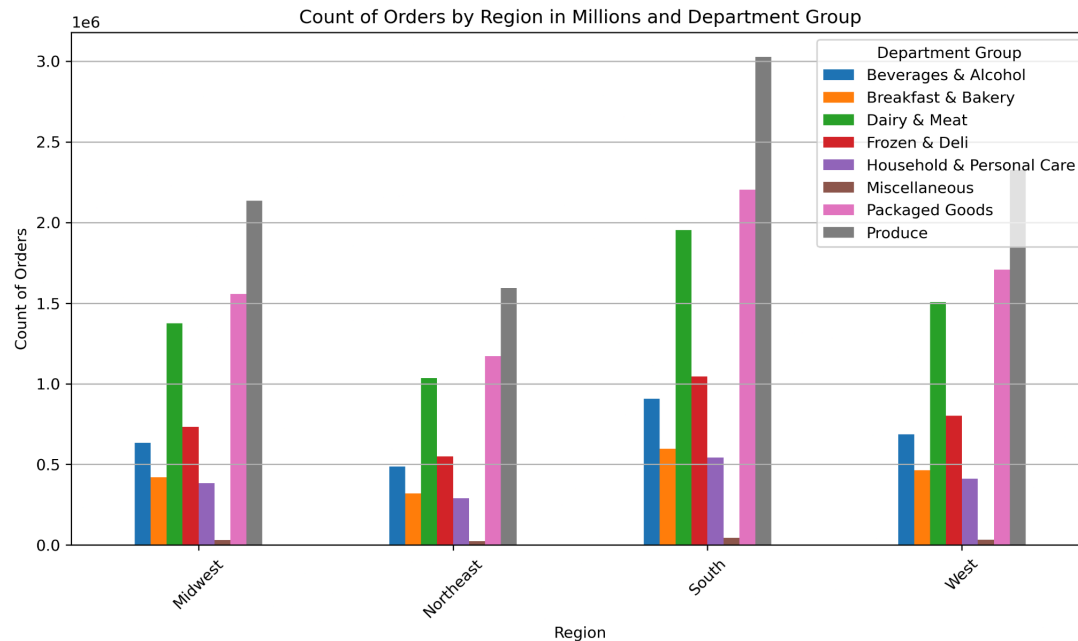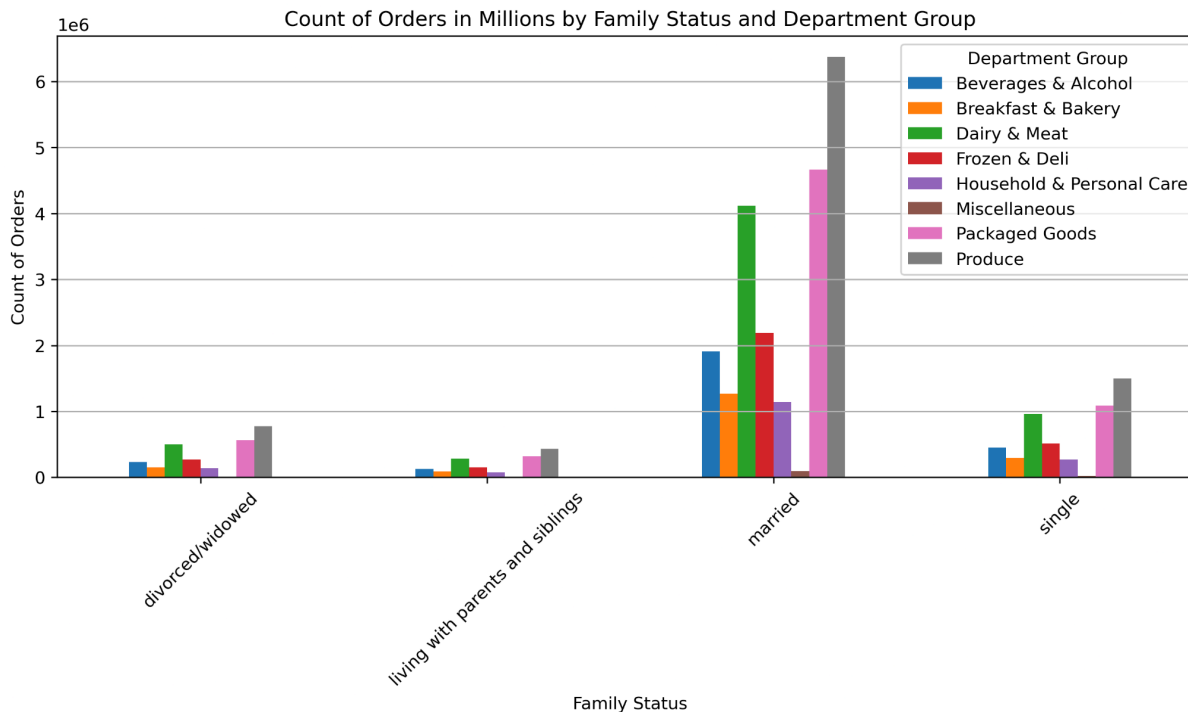
Region and Department Group
Midwest: Produce and Packaged Goods are the most ordered, with Dairy & Meat also significant.
Northeast: Similar to the Midwest, but with slightly more emphasis on Packaged Goods.
South: High orders in Produce and Dairy & Meat, with Packaged Goods also popular.
West: Produce leads, followed by Packaged Goods and Dairy & Meat.

Family Status and Department Group
Married: Highest orders across all departments, especially in Produce, Packaged Goods, and Dairy & Meat.
Single: More focused on Produce and Packaged Goods, with less emphasis on other departments.
Divorced/Widowed: Lower overall orders, but similar preferences to singles.
Living with Parents and Siblings: Least orders, with a focus on Produce and Packaged Goods.

Count of Orders in Millions by Income Group and Department Group
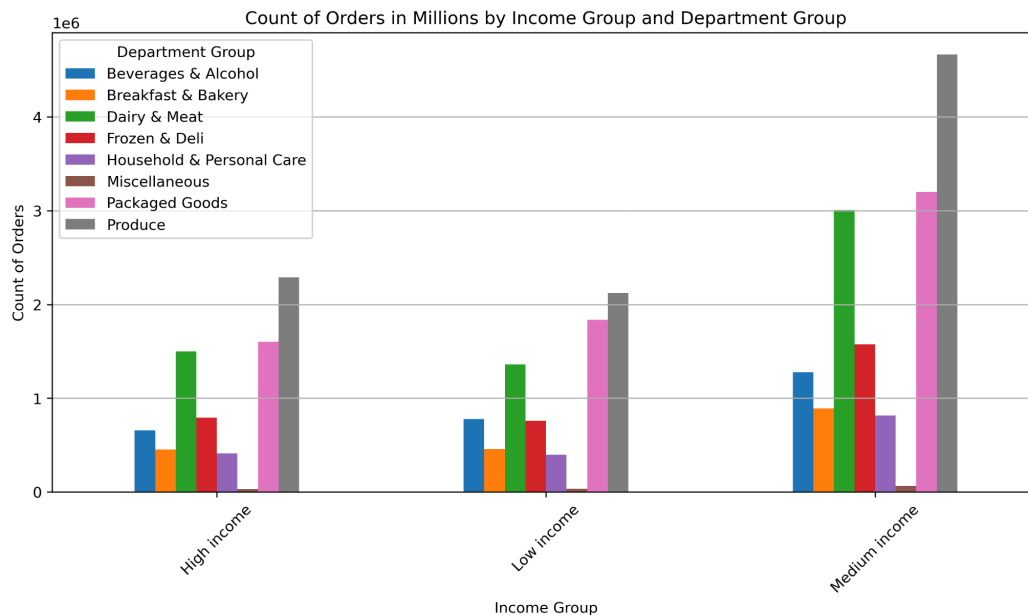
Income Group and Department Group

High Income: Favor Produce and Packaged Goods, with Dairy & Meat also significant.

Low Income: Similar pattern, but with slightly less emphasis on Packaged Goods.

Medium Income: Highest orders overall, especially in Produce, Packaged Goods, and Dairy & Meat.

General Observations

- Produce is consistently the most ordered department across all demographics.
- Packaged Goods and Dairy & Meat are also popular, particularly among adults, married individuals, and medium-income groups.
- Regional differences are subtle, with all regions showing a strong preference for Produce.

Appendix - additional visualizations for check up: