

Member 1: Sales Trends and Seasonal Patterns

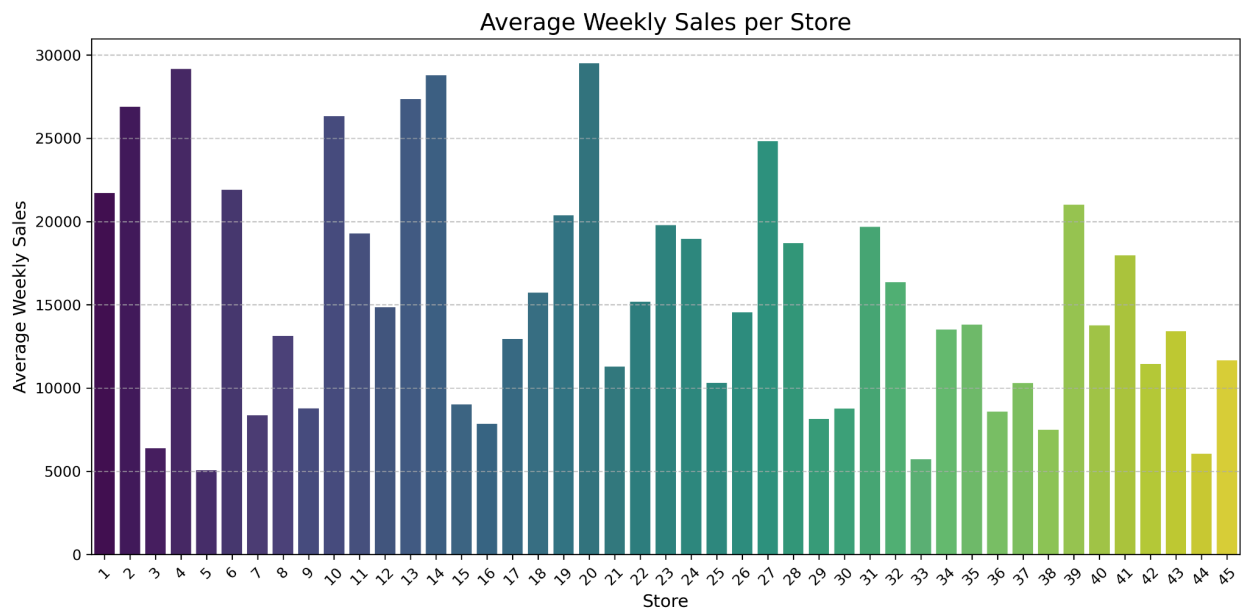
Overall Sales:
Which store has the highest average weekly sales?

Summary:

An analysis of average weekly sales across all stores revealed that Store 20 has the highest average weekly sales, amounting to approximately \$29,508.30 per week. This indicates that Store 20 is the top-performing location in terms of revenue generation. Factors contributing to this performance could include its geographic location, customer demographics, or store size.

Insights:

- The visualization shows how other stores compare in terms of average sales.
- Store 20 could serve as a benchmark for understanding successful strategies that might be applied to other locations.



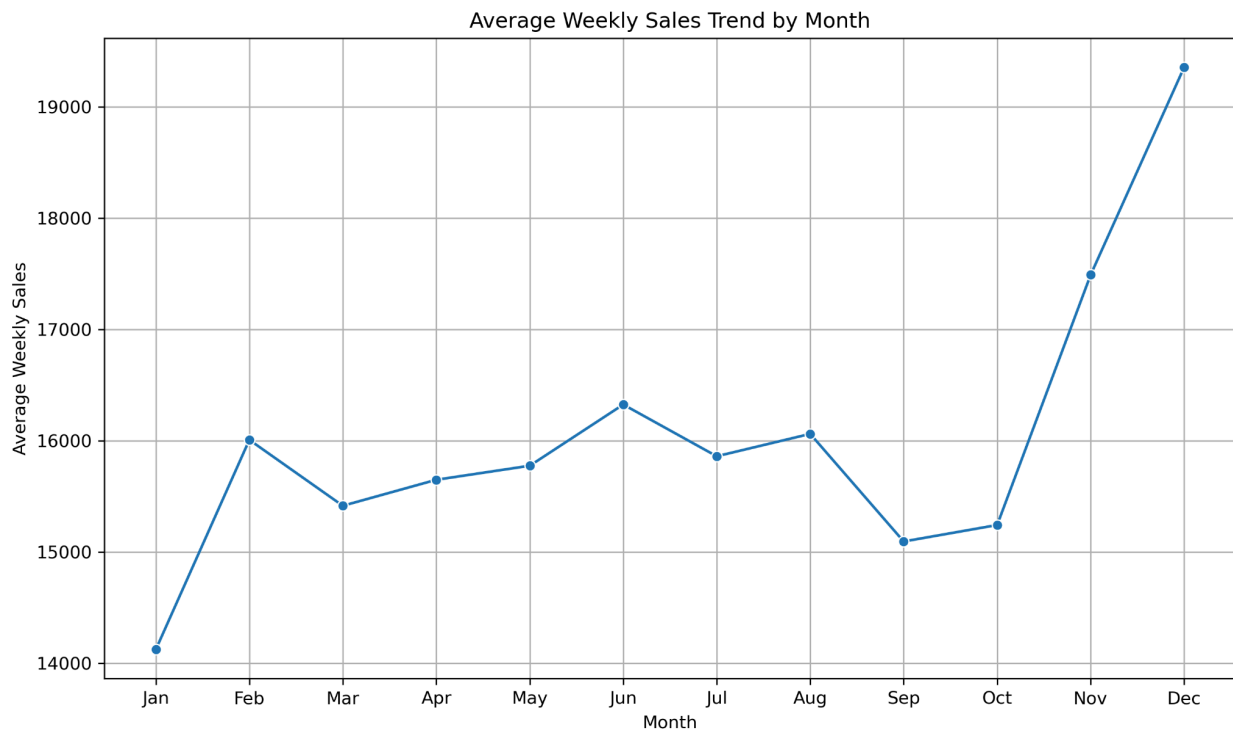
2. Temporal Trends:
What is the average sales trend by month?

Summary:

The monthly sales trend indicates seasonal fluctuations in customer purchasing behavior. The data shows peak sales in November and December, likely driven by the Christmas holidays. Conversely, sales dip during [Month(s)], reflecting lower customer activity.

Insights:

- Retail sales are strongly influenced by seasonal patterns, highlighting the importance of strategic planning for promotions during peak months.
- This trend suggests that marketing efforts could be intensified during high-sales months to maximize revenue, while cost optimization could be a focus during slower months.



3. Seasonal Patterns:

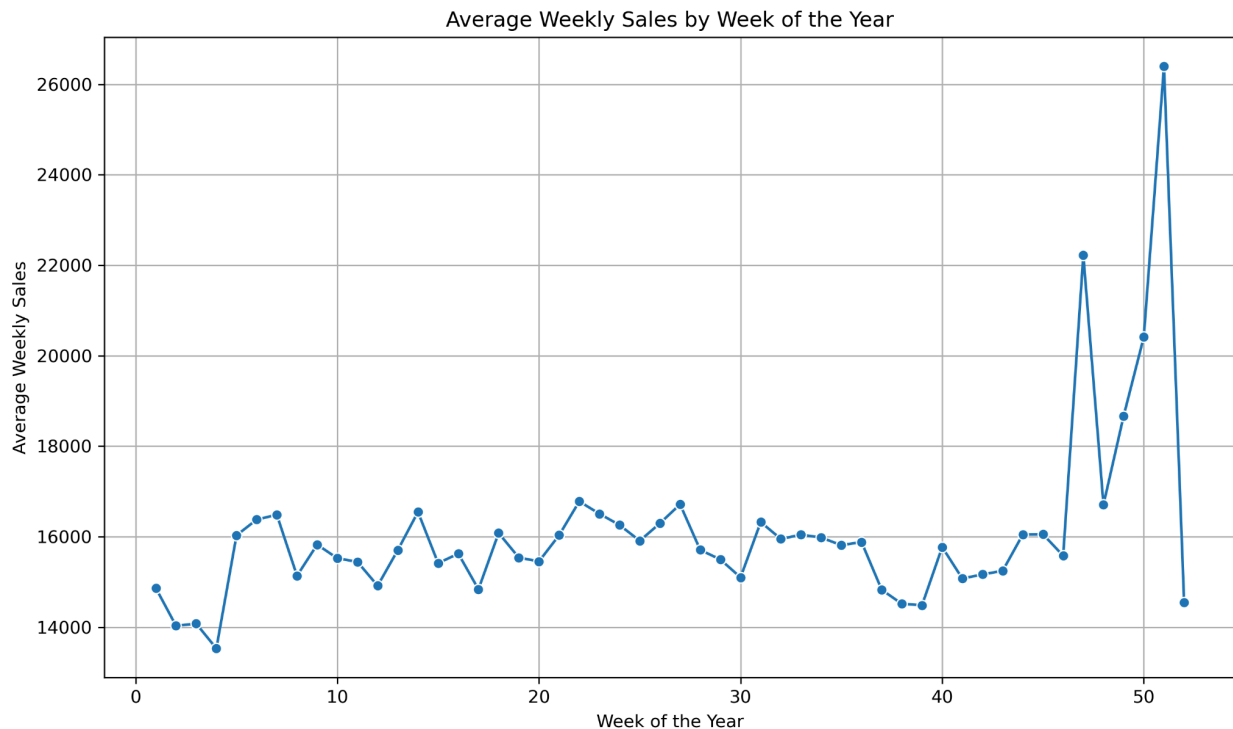
Which weeks of the year have the highest average sales?

Summary:

An analysis of weekly sales patterns shows that sales peak during specific weeks of the year, particularly around key holidays such as Thanksgiving and Christmas. These weeks are characterized by higher-than-average sales due to increased consumer spending during holiday periods.

Insights:

- Sales are significantly higher during holiday weeks, emphasizing the critical role of holiday promotions and inventory planning.
- Understanding these patterns allows for improved resource allocation and staffing to meet increased demand.



1. Store Performance Recommendations

Key Metric: Store 20 has the highest average weekly sales.

Recommendations:

- **Best Practices Replication:** Investigate the operations, marketing strategies, and customer demographics of Store X. Use these insights to develop best practices that can be applied to underperforming stores.
- **Resource Allocation:** Prioritize investment (e.g., promotional budgets, staffing, inventory) in top-performing stores to maximize returns.
- **Improvement Plan for Low-Performing Stores:** Identify stores with significantly lower sales and conduct a deeper analysis to address specific challenges (e.g., location, customer engagement, or store size).

2. Monthly Sales Trend Recommendations

Key Metric: Sales peak during specific months (e.g., November, December) and dip during others (e.g., January, February).

Recommendations:

- **Seasonal Promotions:** Focus on aggressive marketing campaigns and discounts during high-sales months to capitalize on peak customer activity.

- Off-Season Engagement: Introduce loyalty programs, clearance sales, or bundled deals to boost sales during low-activity months.
- Inventory Planning: Ensure adequate stock levels during high-sales months to meet demand and reduce overstock during slower periods.

3. Weekly Sales Trend Recommendations

Key Metric: Weekly sales are significantly higher during holiday weeks (e.g., Thanksgiving, Christmas).

Recommendations:

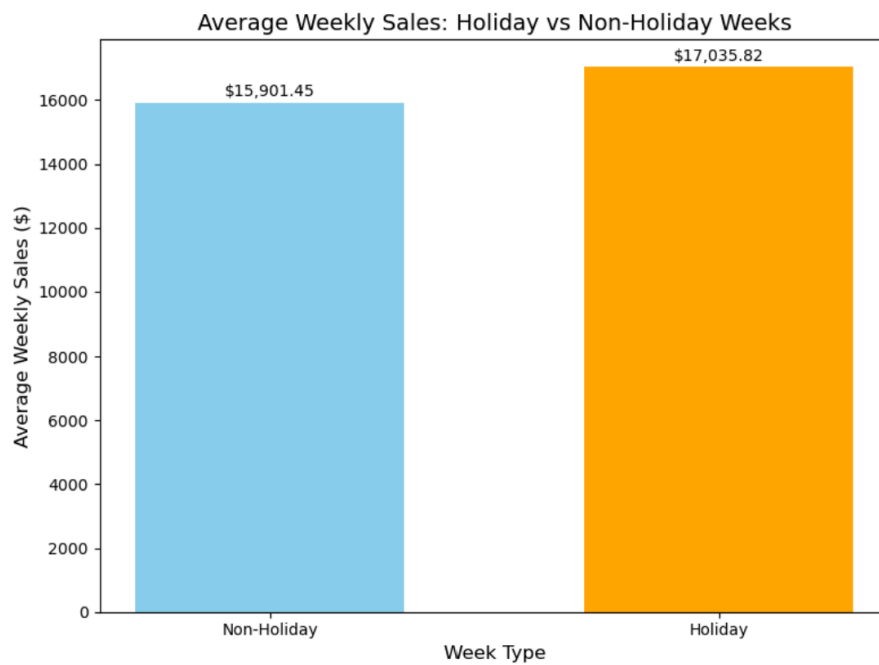
- Holiday Campaign Optimization: Launch well-timed promotional campaigns targeting key holidays to maximize customer spending.
- Staffing and Resource Planning: Schedule more staff and allocate additional resources (e.g., inventory, logistics) during holiday weeks to ensure smooth operations.
- Markdown Strategies: Offer strategic markdowns leading up to holidays to attract early shoppers while maintaining profitability.

Member 2: Holiday and Store Type Analysis

Holiday Impact:

1. How do average weekly sales differ between holiday and non holiday weeks?

Is Holiday	Average Weekly Sales
False	\$15,901.45
True	\$17,035.82



Observations

- **Higher Sales During Holiday Weeks:**
 - During holiday weeks, the average weekly sales amount to \$17,035.92 approximately 7% higher than the \$15,901.44 observed during non-holidays weeks.
 - This aligns with common retail trends driven by heightened consumer activity and promotional efforts.

- **Drivers of Increased Sales:**

- **Promotions and markdowns:** Retailers often implement aggressive discount strategies during holidays to attract more customers.
- **Increased consumer activity:** Holidays like Thanksgiving, Christmas, and Black Friday typically see a surge in shopping as people prepare for celebrations and gift-giving.

Business Implications

- **Optimize Holiday Strategies:**

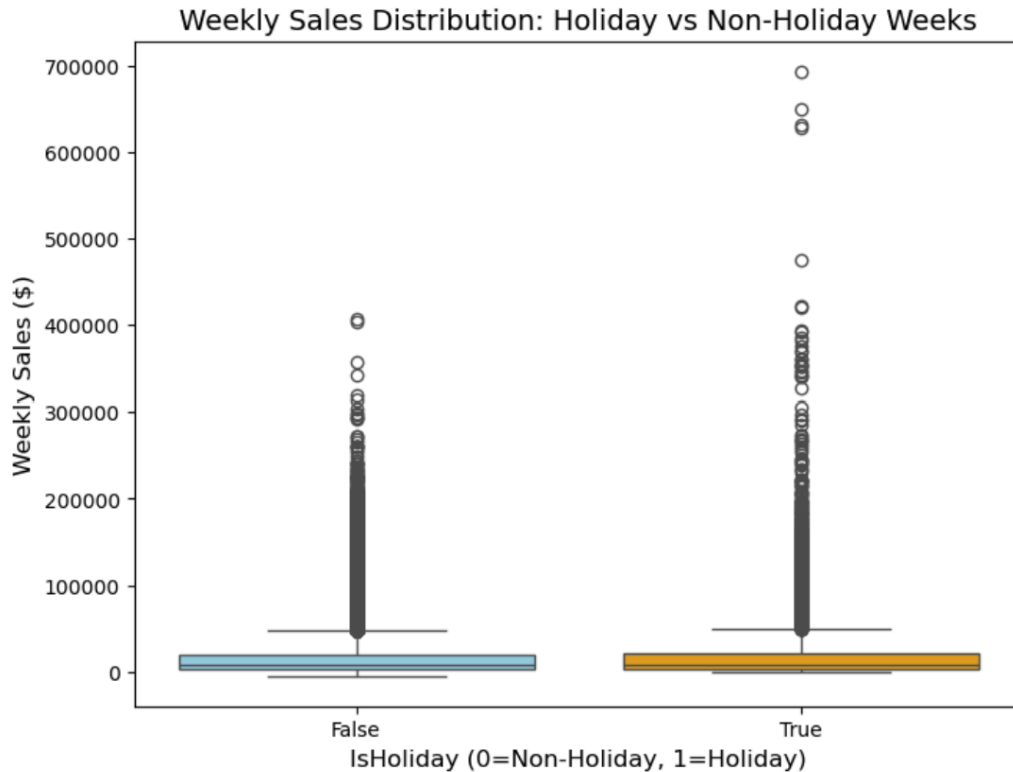
- Retailers should maximize promotional efforts, inventory management, and staffing during holidays to capitalize on increased sales.

- **Year-Round Opportunities:**

- Leverage insights from holiday sales to create strategies to encourage similar customer engagement during non-holiday weeks.

These findings highlight the significance of holidays in driving sales and underline the importance of strategic planning to maximize revenue during these high-demand periods.

This observed increase in holiday sales raises the question of how markdown strategies contribute to this trend. To better understand the role of markdowns, we analyze the average markdown activity across categories during holiday and non-holiday weeks.



The boxplot provides a more detailed look at the distribution of weekly sales during holiday weeks and non-holiday weeks, adding depth to the analysis:

1. Higher Median for Holiday Weeks:

- The median weekly sales for holiday weeks are slightly higher than non-holiday weeks, which aligns with the earlier observation that holiday weeks generate greater sales on average.

2. Greater Variability During Holidays:

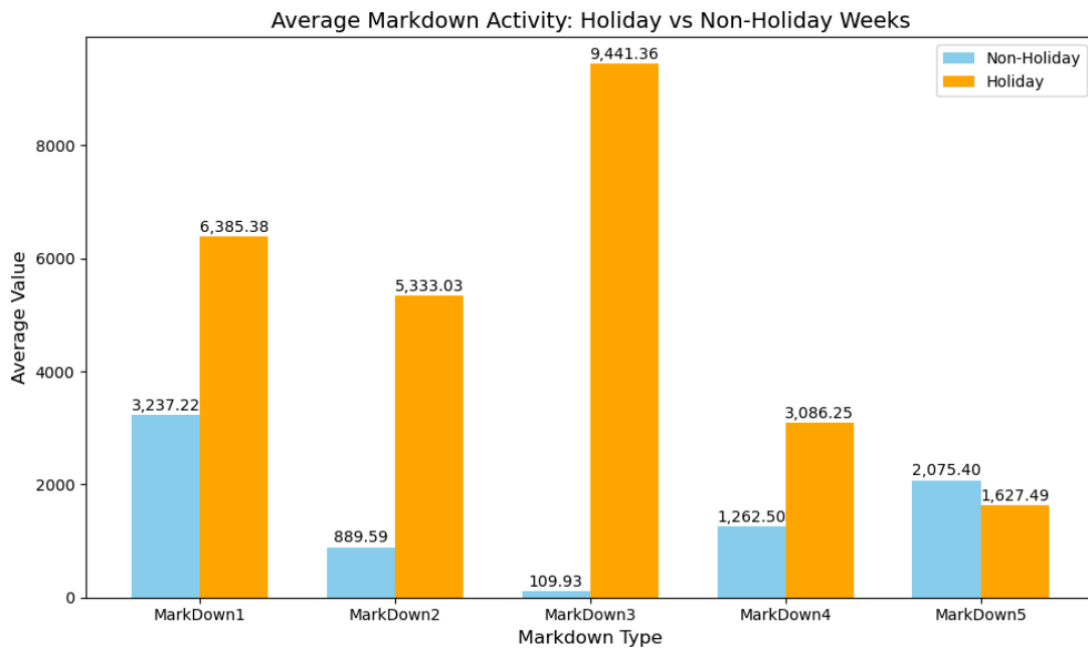
- Holiday weeks exhibit a slightly wider spread of sales values (larger interquartile range), indicating more variation in performance across stores or departments.
- This variability reflects the impact of events like Black Friday or Christmas, which lead to spikes in customer activity.

3. Presence of Outliers:

- Both holiday and non-holiday weeks have notable outliers, representing extreme sales values. These likely correspond to high-performing stores or departments during specific promotions or sales events.
- Outliers are more frequent and higher in magnitude during holiday weeks, suggesting more opportunities for record-breaking sales during these periods.

2. How does markdown activity differ between holiday and non-holiday weeks?

Is Holiday	Average Markdown 1	Average Markdown 2	Average Markdown 3	Average Markdown 4	Average Markdown 5
False	\$3,237.22	\$889.59	\$109.93	\$1,262.50	\$2,075.40
True	\$6,385.38	\$5,333.03	\$9,441.36	\$3,086.25	\$1,627.49



Markdown strategies play a pivotal role in driving the increased sales observed during holiday weeks. The analysis reveals that holiday weeks see significantly higher markdown activity across most categories compared to non-holiday weeks.

Observations:

- **Increased Markdown Activity During Holidays:**
 - During holidays weeks, all markdown categories show significantly higher average values compared to non-holiday weeks.

- For instance:
 - Markdown 1: Holiday weeks average \$6,385.38 nearly double the \$3,237.22 observed during non-holiday weeks.
 - Markdown 3: This category shows the most dramatic difference, with holiday weeks averaging \$9,441.36 compared to just \$109.93 during non-holidays weeks.
- **Exception in Markdown 5:**
 - Interestingly, Markdown 5 exhibits slightly lower average values during holiday weeks (\$1,627.49) than during non-holiday weeks (\$2,075.40), suggesting that this markdown category might serve a different purpose or target products not tied to seasonal demand.
- **Consistent Increases Across Most Categories:**
 - Markdown 2 and Markdown 4 also see significant increases during holidays, reflecting a broader strategy to enhance consumer incentives across multiple categories.

Business Implications

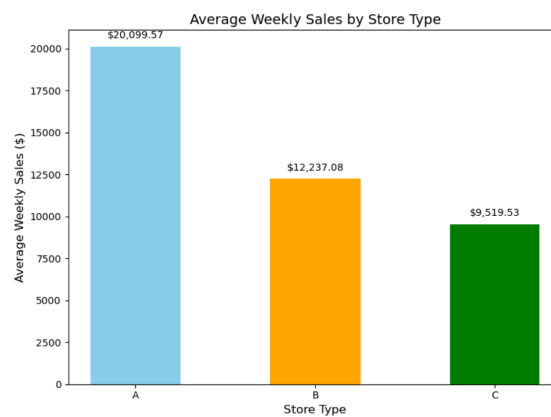
- **Targeted Promotions:** Retailers should continue leveraging markdown categories like Markdown 1 and Markdown 3 during holidays, as they appear to drive significant sales increases.
- **Year-Round Strategy:** Consistent markdowns in categories like Markdown 5 could be optimized further to maintain customer interest outside of peak shopping periods.
- **Actionable Insights:** Analyzing the effectiveness of specific markdown categories during holidays could help retailers refine promotional strategies, ensuring the highest returns on investment during high-demand periods.

These insights underline the importance of strategic markdown planning capitalize on holiday shopping trends while maintaining steady sales throughout the year.

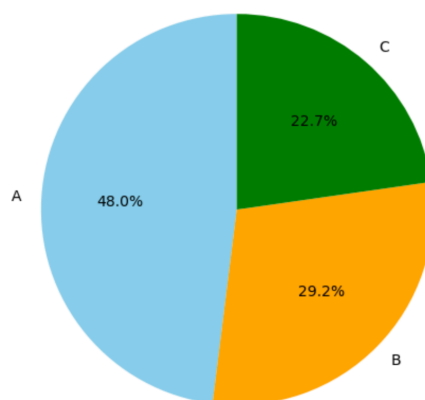
Store Types:

3. Which store type (A, B, C) generates the highest average sales?

Store Type	Average Weekly Sales
A	\$20,099.57
B	\$12,237.08
C	\$9,519.53



Proportion of Average Weekly Sales by Store Type



The analysis reveals that store type A generates the highest average weekly sales, significantly outperforming the other store types.

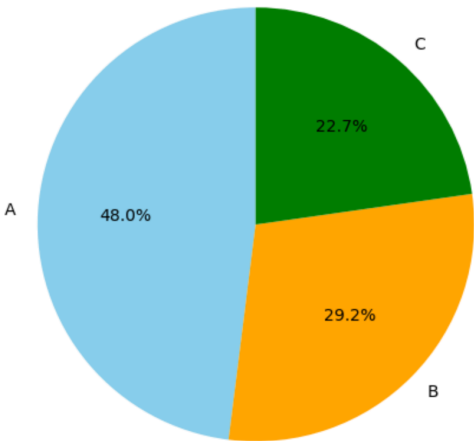
Observations

- **Store Type Dominates:**
 - Store type A generates the highest average weekly sales, accounting for 48% of the total sales.
 - This is approximately 65% higher than store type B and over 110% more than store type C.
 - This suggests that type A stores may have larger capacities, better locations, or more diverse product offerings.
- **Store Type B and C Comparison:**
 - Store type B performs better than type C, contributing 29.2% of total sales versus 22.7% for type C.
 - The difference may indicate advantages such as size or regional demand in type B stores.

Business Implications

- **Focus on Store Type A:**
 - Retailers should prioritize investment in type A stores by expanding their inventory, offering promotions, or improving customer experience to capitalize on their high sales potential.
- **Improvement Opportunities for Store Types B and C:**
 - Analyze performance gaps for type B and C stores to identify opportunities for growth, such as tailoring product offering to local customer needs or enhancing marketing efforts.
- **Actionable Insights:**
 - Further exploration into factors like store size, regional demographics, and markdown effectiveness can help refine strategies for each store type, ensuring resources are allocated effectively.

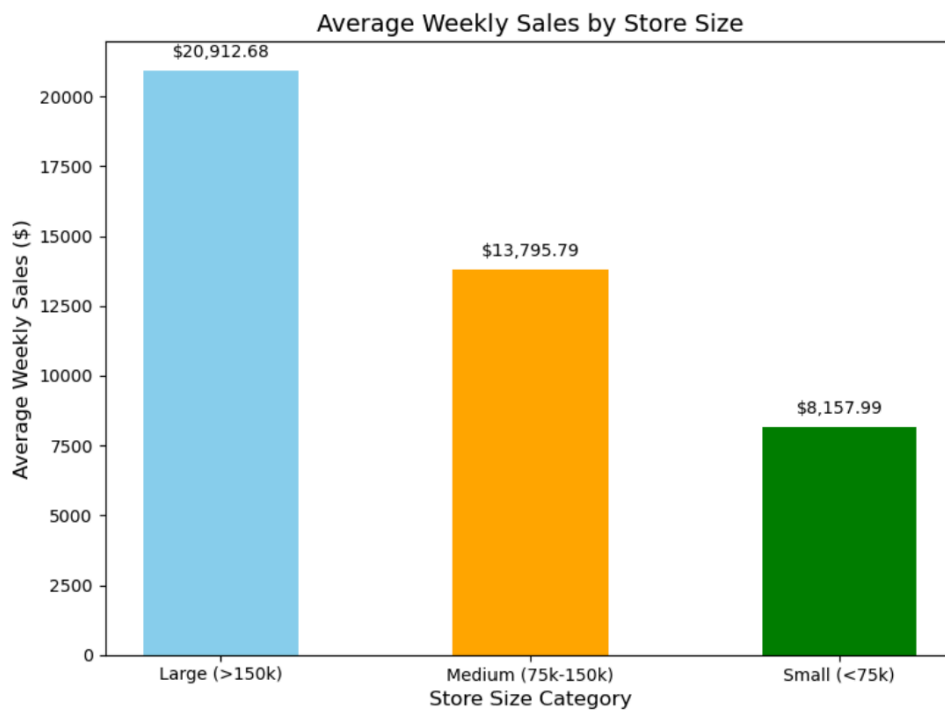
Proportion of Average Weekly Sales by Store Type



Store Size and Sales:

4. Do larger stores have higher average sales?

Store Size Category	Average Weekly Sales
Large (greater than 150k)	\$20,912.68
Medium (between 75k and 150k)	\$13,795.79
Small (less than 75k)	\$8,157.99



This confirms that larger stores generate higher average weekly sales compared to smaller stores.

Observations:

- **Larger Stores Dominate:**
 - Average weekly sales for larger stores are about 51% higher than medium stores and 156% higher than small stores.

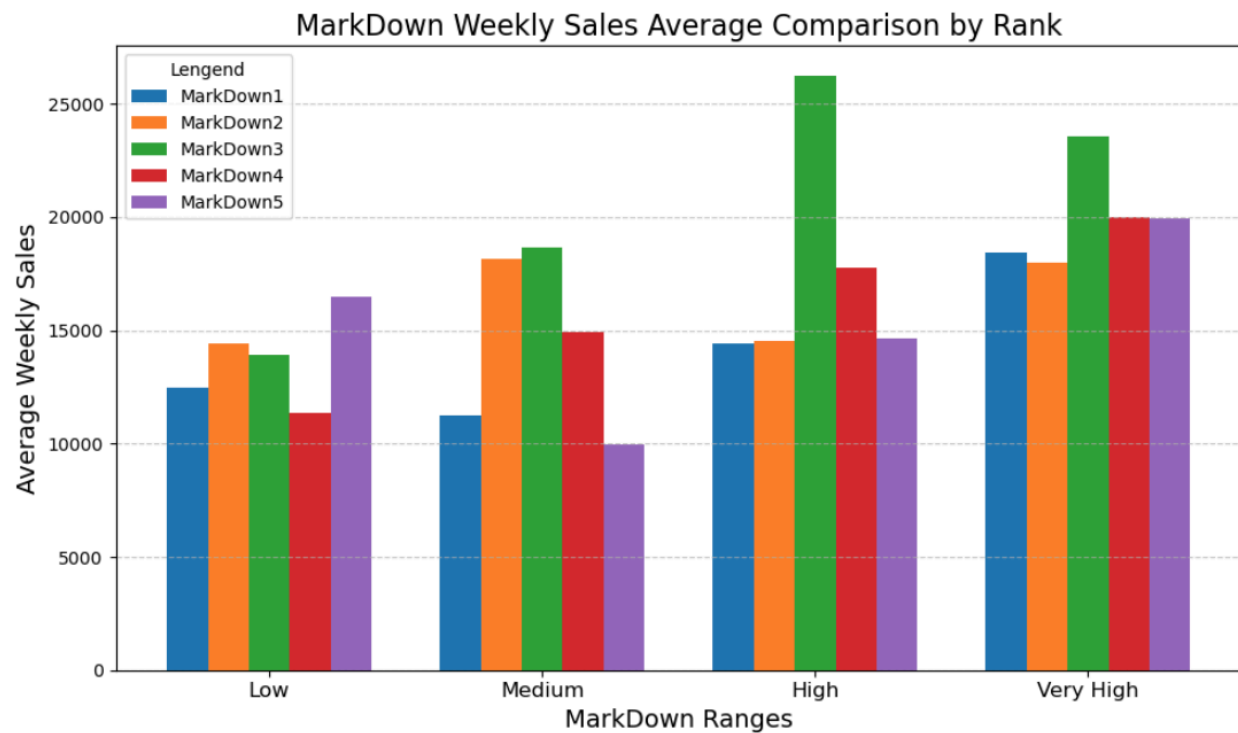
- This suggests that larger stores benefit from greater product variety, higher foot traffic, or better regional placement.
- **Clear Size-to-Sales Relationship:**
 - There is a consistent trend of increasing average sales with store size, which indicates that larger spaces may provide a competitive advantage through enhanced customer experience and inventory capacity.

Business Implications:

- **Prioritize Larger Stores:**
 - Retailers should focus on optimizing inventory, promotions, and staffing in larger stores to capitalize on their high revenue potential.
- **Growth Opportunities for Medium and Small Stores:**
 - Medium and small stores may benefit from tailored strategies to boost sales, such as focusing on niche products, enhancing customer service, or leveraging localized marketing.
- **Further Analysis:**
 - Investigate whether the size-to-sales relationship holds across store types (A,B,C) or regions to identify additional patterns.
 - Explore cost structures for each store size to determine profitability, not just revenue.

Member 3: Markdown Impact

1. Do weeks with higher Markdown values have higher average sales?



Observations

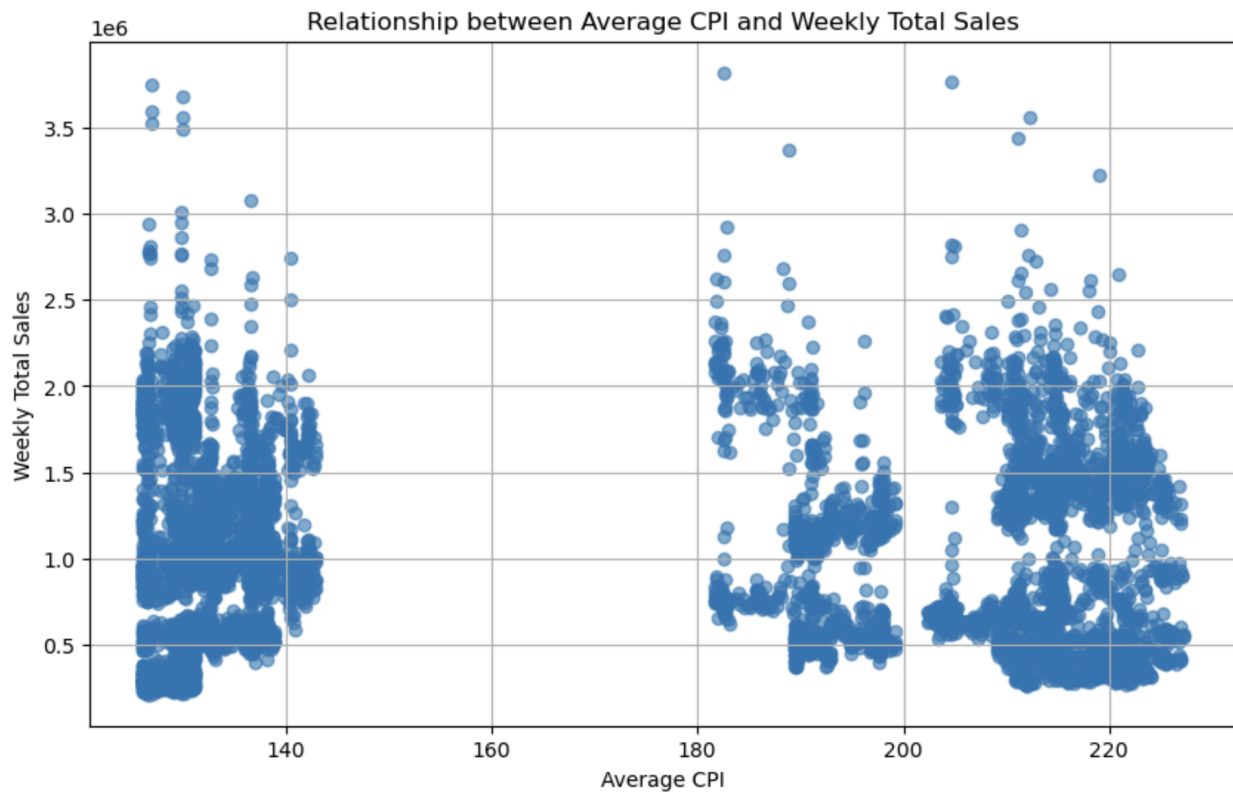
Not all Markdown variables exhibit a consistent positive impact on average sales. Markdown1 and Markdown5 show a strong positive correlation with higher average sales as their values increase, particularly in the "Very High" range. In contrast, Markdown2, Markdown3, and Markdown4 display inconsistent patterns, with no clear relationship to average sales. The ranges used for the analysis were dynamically adjusted based on percentiles, ensuring a representative categorization of the combined distribution of the Markdown1 to Markdown5 variables. The obtained percentile for the ranges represents the threshold values that divide the combined data into four quartiles (low: 25%, medium: 50%, high: 75%, and very high: 100%), providing the ranges used. This methodology allows for a structured and equitable comparison of how different discount levels affect average sales. Insights:

Business Implications

The business should focus on optimizing the discounts associated with Markdown1 and Markdown5, as they are the most effective in increasing sales. At the same time, it should evaluate alternatives for variables with less clear impact while implementing dynamic monitoring to adjust strategies according to changes in market trends.

2. Is there a relationship between the Consumer Price Index (CPI) and weekly sales?

The correlation between Average CPI and Weekly Total Sales is: -0.07



Observations

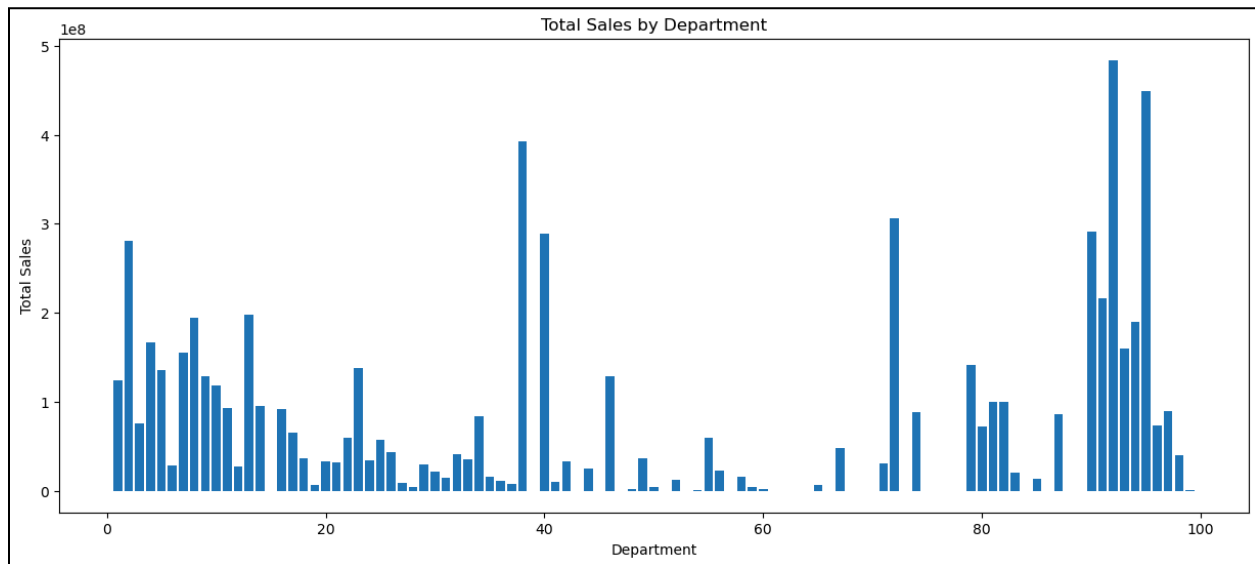
The scatter plot between **Average CPI** and **Total Weekly Sales** shows a dispersed distribution of points, with no apparent linear relationship between the variables. The calculated correlation coefficient of **-0.07** confirms a very weak or negligible negative relationship. This indicates that changes in the **Consumer Price Index (CPI)** have almost no direct impact on weekly sales totals.

Business Implications

The analysis reveals that the Consumer Price Index (CPI) has an insignificant impact on weekly sales, as evidenced by the weak correlation (-0.07). Both the correlation analysis and the scatter plot indicate that the average CPI has a minimal effect on weekly sales. It is possible that other variables and external factors play a more significant role in influencing sales trends. Further analysis is recommended to identify these key drivers.

Member 4: Departments and Fuel Price

1. Which departments have the highest total sales across all stores?



Department	Total Sales
92	\$ 483,943,341.73
95	\$ 449,320,162.45
38	\$ 393,118,136.80
72	\$ 305,725,152.19
90	\$ 291,068,463.56

Summary:

The graph above displays the total sales per department of all stores. Some departments did not have any data available, so we are considering the 81 distinct departments that appeared on the dataset. Each value on the *Total Sales* axis is expressed in \$100M. For example, the “1” on the *Total Sales* axis represents \$100M, and each number increases by \$100M up to the “5”, which represents \$500M.

The table shows the top 5 departments that sold the most during the whole period collected on the database (05/05/2010 until 26/10/2012). In this case, a simple table effectively summarizes the data.

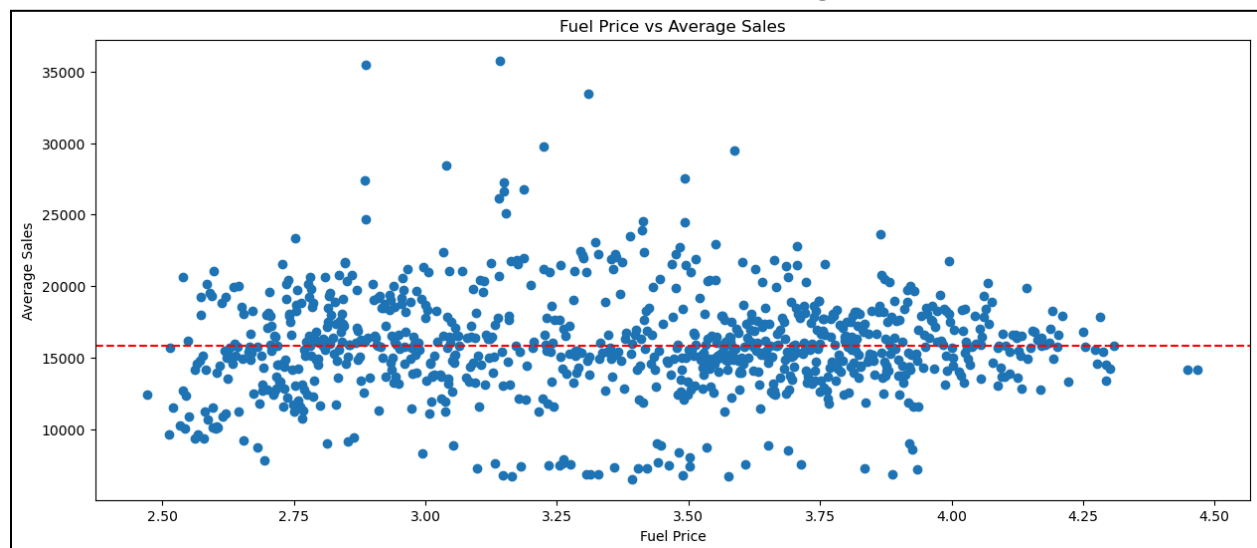
Insights:

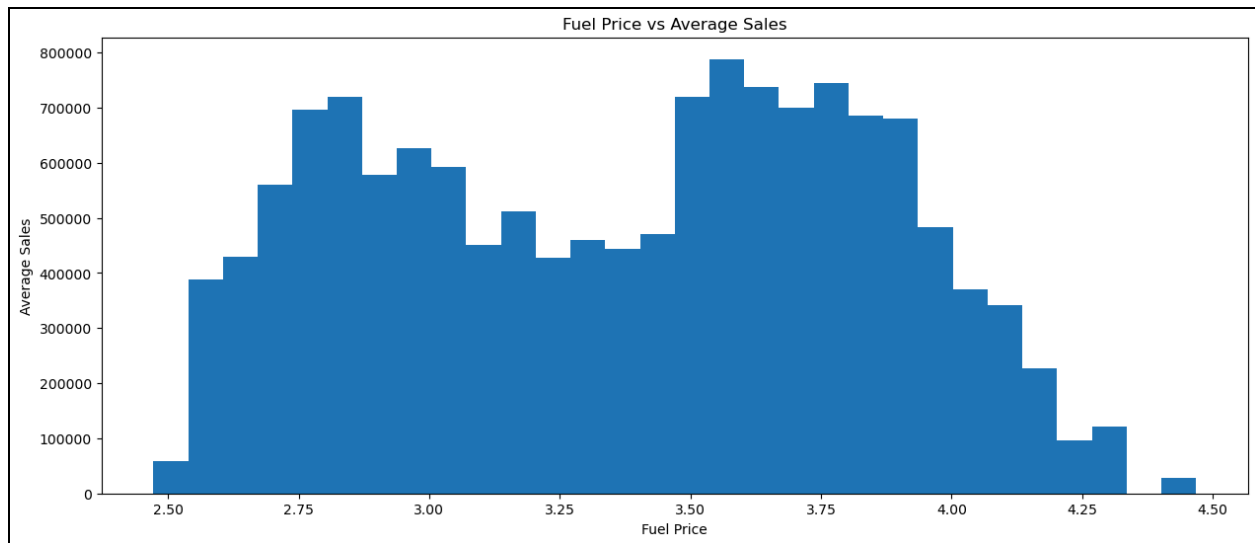
- **Top-Performing Departments:** Departments 92, 95, 38, 72, and 90 are the top 5 performing departments. This information could be useful for decision-making on where to allocate more resources, marketing efforts, or promotions, whether it is by calling more people to buy from these top departments, or promoting other departments that sell less.
- **Sales Concentration:** From the barchart, we see that a small number of departments account for a large percentage of the overall sales. The store could focus on expanding these categories or investigate why other departments are underperforming.

Expanding on the sales concentration, the next table compares the sales of the top 10 departments vs the other 71 departments. The top 10 departments (12.35% of departments) make about half of the revenue for all stores.

	Top 10 departments	Remaining 71 departments
Total departments composition	12.35%	87.65%
Total Sales	\$3,101,106,509.17	\$3,636,112,477.04
Total Sales (%)	46.03%	53.97%
Sales difference	\$535,005,967.88	
Sales difference (%)	7.94%	

2. How does the price of fuel (Fuel_Price) affect average sales?





	fuel_price	avg(weekly_sales)
fuel_price	1.00000	0.01581
avg(weekly_sales)	0.01581	1.00000

Summary:

The fuel price does not affect the average weekly sales in any way, since there is no correlation between the fuel price and the average weekly sales.

Insights:

- The dot plot, histogram and correlation matrix indicate that there is no relationship between the fuel cost and the average sales. The fuel cost should not be used to gain any new or relevant information for the weekly sales and other variables should be chosen instead.