Based on the initial tests, including ANOVA and the Chi-squared test of independence, we found no significant insights regarding the relationships between our categorical variables. This lack of significant results supports our assumption that the products in our dataset are primarily non-seasonal.

Explanation of Findings

1. **ANOVA Results**: The ANOVA tests indicated a failure to meet the normality assumption across the analyzed variables. As a result, we couldn't establish any meaningful differences in means across groups, further confirming that the products do not exhibit clear seasonal trends based on the time of year.
2. **Chi-squared Test of Independence**: Similarly, the Chi-squared tests for categorical variables—State vs. Category, City vs. Category, Region vs. Category, Ship Mode vs. Category, and Order Month vs. Category—yielded high p-values, suggesting a lack of association between these variables. This reinforces the idea that product sales are not significantly influenced by geographical or temporal factors.

Assumptions on Product Seasonality

These findings align with the characterization of the products as non-seasonal. Although seasonal decomposition tests might indicate the presence of seasonal patterns in sales data, this observation does not necessarily imply that the products themselves are inherently seasonal. Instead, it is likely that any observed seasonal effects are driven by external factors such as:

- **Discounts and Promotions**: The seasonal patterns observed may primarily stem from discount strategies employed during specific months. For example, if products are frequently discounted during certain times of the year, this can create artificial spikes in sales that mimic seasonal demand, despite the products themselves not being seasonal.
- **Market Dynamics**: External economic conditions, such as consumer spending behaviors or promotional periods, can also influence sales patterns. However, these factors are not reflected in the available data, as we do not have insights into specific discount periods or marketing campaigns that could explain the fluctuations.

Next Steps

To further investigate the sales trends, we should consider incorporating machine learning models that can account for complex interactions between various features. By examining economic conditions and other relevant factors, we can better understand the underlying

drivers of sales, moving beyond the limitations of traditional statistical methods. This approach will provide a more nuanced analysis of how and why sales fluctuate, particularly in relation to promotional strategies and economic indicators.