

3. The Stem-and-leaf Plot Shows The Cost Of Lamps At A Department Store. (a) What Is The Median Cost?

3. The Stem-and-leaf Plot Shows The Cost Of Lamps At A Department Store. (a) What Is The Median Cost?

Understanding data visualization tools is essential for analyzing and interpreting sales data in retail environments. Among these tools, the stem-and-leaf plot offers a straightforward and insightful way to represent numerical data, such as the prices of lamps in a department store. This article discusses how to interpret a stem-and-leaf plot that displays lamp costs and, specifically, how to determine the median cost of lamps from this visualization.

Introduction to Stem-and-Leaf Plots in Retail Data Analysis

In a busy department store, understanding the distribution of product prices can help managers make informed decisions about pricing strategies, inventory management, and promotional activities. One of the most effective descriptive statistics tools for such purposes is the stem-and-leaf plot.

A stem-and-leaf plot is a graphical representation that organizes data points by place value, allowing for quick visualization of distribution, shape, and central tendency. It presents data in a way that maintains the original values, making it easier to identify medians, modes, and ranges.

What Is a Stem-and-Leaf Plot?

A stem-and-leaf plot divides each data point into two parts:

- The stem, which typically consists of all but the final digit (or digits) of a number.
- The leaf, which is usually the final digit.

For example, for a lamp cost of \$45, the stem might be "4," and the leaf "5."

Example:

Stem	Leaves
4	2 5 7
5	0 3 8
6	1 4 9

This table indicates lamp prices of \$42, \$45, \$47, \$50, \$53, \$58, \$61, \$64, and \$69.

The stem-and-leaf plot offers a visual summary of the data, showing where most lamp prices are clustered and highlighting any outliers or gaps.

Understanding the Context: Lamp Costs at a Department Store

Suppose a department store conducted a sale and recorded the prices of lamps purchased by customers. The data collected is as follows (in dollars):

`42, 45, 47, 50, 53, 58, 61, 64, 69, 70, 73, 75, 78, 80, 85`

Constructing and analyzing this data with a stem-and-leaf plot helps determine the median, which is the middle value of the ordered data set. The median provides a measure of central tendency that is less affected by outliers than the mean.

Constructing the Stem-and-Leaf Plot for Lamp Costs

Step 1: Organize the data in increasing order

`42, 45, 47, 50, 53, 58, 61, 64, 69, 70, 73, 75, 78, 80, 85`

Step 2: Identify stems and leaves

- Tens digit as stem

- Units digit as leaf

Step 3: Create the plot

```
| Stem | Leaves |  
|-----|-----|  
| 4 | 2 5 7 |  
| 5 | 0 3 8 |  
| 6 | 1 4 9 |  
| 7 | 0 3 5 8 |  
| 8 | 0 5 |
```

This stem-and-leaf plot succinctly summarizes the distribution of lamp prices.

Determining the Median Cost from the Stem-and-Leaf Plot

The median is the middle value in an ordered data set. When the number of data points is odd, the median is the middle number. When even, it is the average of the two middle numbers.

Number of data points:

`15` (since there are 15 lamp prices)

Step 1: Find the position of the median

- Since 15 is odd, the median is located at position $\lceil (15 + 1) / 2 \rceil = 8$.

Step 2: Identify the 8th value in the ordered list

Ordered data:

1. 42
2. 45
3. 47
4. 50
5. 53
6. 58
7. 61
8. 64

9. 69
10. 70
11. 73
12. 75
13. 78
14. 80
15. 85

The 8th value is 64.

Therefore, the median lamp cost is \$64.

Why Is the Median a Useful Measure in Retail Data?

The median provides a more representative measure of central tendency when data is skewed or contains outliers. For example:

- If a few lamps are extremely expensive (say, over \$200), the mean might be artificially inflated.
- The median remains unaffected by such outliers, giving a clearer picture of the typical lamp price.

In this scenario, knowing the median helps store managers understand the "middle" price point, aiding in:

- Setting competitive prices
- Planning inventory based on typical customer spending
- Designing marketing strategies aimed at the most common price range

Additional Insights from the Stem-and-Leaf Plot

Beyond the median, the stem-and-leaf plot provides other valuable insights:

- Price Clusters: Most lamp prices fall between \$40 and \$80, indicating the main target price range.
- Spread of Data: The range spans from \$42 to \$85, showing the variation in lamp prices.
- Outliers: If any data points were significantly higher or lower than the rest, they would be visible as isolated leaves.

Understanding these aspects helps in making informed business decisions.

How to Use the Stem-and-Leaf Plot for Further Analysis

1. Calculate the Mode: Identify the most frequently occurring price or price range.
2. Determine the Range: Subtract the smallest from the largest value ($85 - 42 = 43$).
3. Identify Quartiles: Divide the data into four equal parts to understand the distribution better.
4. Assess Skewness: Observe the shape of the plot—if data skews towards higher or lower prices.

These analyses support strategic decisions related to pricing, discounts, and inventory.

Conclusion: The Importance of the Median in Retail Pricing

In summary, the median cost of lamps at the department store, derived from the stem-and-leaf plot, is \$64. This value offers a reliable snapshot of the typical lamp price, unaffected by extremely high or low prices. By utilizing stem-and-leaf plots, retail managers can visualize data distribution effectively, identify trends, and make data-driven decisions.

Understanding how to interpret such plots and calculate central measures like the median empowers retailers to optimize pricing strategies, improve customer satisfaction, and enhance overall sales performance. Whether analyzing lamp prices or other product categories, the principles outlined here are fundamental tools in the retail data analysis toolkit.

Additional Tips for Creating and Interpreting Stem-and-Leaf Plots

- Always organize your data in increasing order before constructing the plot.
- Use clear labels for stems and leaves for better readability.
- When dealing with decimal or larger numbers, adjust the stem and leaf accordingly (e.g., hundreds, tenths).
- Cross-verify the data points with the plot to ensure accuracy.

By mastering these techniques, retail analysts and managers can leverage stem-and-leaf plots to gain meaningful insights into sales data and pricing strategies.

In conclusion, interpreting a stem-and-leaf plot to find the median cost of lamps provides a clear, visual, and accurate understanding of the central tendency within retail data. This simple yet powerful tool facilitates smarter business decisions, ensuring that pricing aligns with customer expectations and market trends.

Frequently Asked Questions

What is a stem-and-leaf plot and how does it display data like lamp costs?

A stem-and-leaf plot is a method of organizing data where each number is split into a stem (usually the leading digits) and a leaf (the last digit). It visually displays the distribution of data, such as lamp costs, making it easy to see the median, range, and frequency of values.

How do you determine the median cost of lamps from the stem-and-leaf plot?

To find the median, first list all the lamp costs in order from the stem-and-leaf plot, then locate the middle value. If there's an odd number of data points, the median is the middle number; if even, it's the average of the two middle numbers.

Why is the median a useful measure for lamp costs in this plot?

The median provides a central value that is not skewed by extremely high or low prices, giving a better sense of the typical lamp cost at the department store.

Can you explain the steps to find the median from a stem-and-leaf plot?

Yes. First, count the total number of data points. Then, identify the middle position (for odd counts) or the two middle positions (for even counts). Next, locate these positions in the ordered data to find the median value.

If the stem-and-leaf plot shows an odd number of lamp prices, how is the median calculated?

When there is an odd number of prices, the median is the value at the middle position when all data points are ordered from least to greatest.

What does the stem-and-leaf plot reveal about the distribution of lamp prices at the store?

The plot shows how lamp costs are spread out, indicating if prices are clustered around certain values, if there are many cheap or expensive lamps, and the overall shape of the price distribution.

How can understanding the median cost help customers or store managers?

For customers, it provides an idea of the typical lamp price, aiding in budget planning. For store managers, it helps in pricing strategies by understanding the central tendency of lamp costs and adjusting inventory or marketing accordingly.

Additional Resources

The Stem-and-Leaf Plot Shows The Cost Of Lamps At A Department Store. (a) What Is The Median Cost?

Understanding the median cost of lamps within a department store setting is vital for retailers, consumers, and analysts alike. The use of a stem-and-leaf plot to visualize this data provides an efficient means to quickly grasp the distribution and central tendency of lamp prices. In this comprehensive review, we delve into the significance of the stem-and-leaf plot, interpret its data, and specifically determine the median cost of lamps, offering insights into pricing strategies, consumer affordability, and market trends.

Introduction to Stem-and-Leaf Plots and Their Significance

What Is a Stem-and-Leaf Plot?

A stem-and-leaf plot is a graphical representation of a dataset that displays its distribution while maintaining the original data points. It combines elements of a histogram and a sorted list, allowing for quick visual analysis of the data's shape, spread, and central tendency.

In a typical stem-and-leaf plot:

- The "stem" represents the leading digit(s) of each data point.
- The "leaf" represents the remaining digit(s).
- Data points are listed alongside their corresponding stems, often in ascending order.

For example, if lamp prices are \$15, \$23, and \$27, the stems could be 1, 2, etc., with leaves indicating the units.

Advantages of Using a Stem-and-Leaf Plot

- Preservation of Original Data: Unlike histograms, which group data into bins, stem-and-leaf plots retain individual values, allowing precise median calculations.
- Visualization of Distribution: They help identify skewness, clusters, gaps, and outliers in data.
- Ease of Construction and Interpretation: For small to moderate datasets, they are straightforward and quick to interpret.
- Facilitates Calculation of Measures of Central Tendency: They readily support median, mode, and mean computations.

Understanding the Dataset: The Cost of Lamps

The Context of the Data

In a typical department store, lamp prices can vary significantly based on style, brand, size, and features. Visualizing this variation through a stem-and-leaf plot allows stakeholders to assess the price range, identify common price points, and make informed decisions.

Suppose the store provided a dataset of lamp prices, which has been summarized in a stem-and-leaf plot. The data might look like this:

Stem	Leaves
1	5, 7, 8, 8, 9
2	0, 1, 3, 4, 5
3	0, 2, 2, 5, 7
4	0, 2, 3

This table indicates, for example, that lamps costing \$15, \$17, \$18, etc., are grouped under the stem "1," while those costing \$20-\$29 are under "2," and so on.

Data Distribution and Its Implications

Analyzing the distribution can reveal:

- Skewness: Whether most lamps are priced towards the lower or higher end.
- Clusters: Price points where many lamps are concentrated.
- Outliers: Extremely high or low prices that stand apart from the main distribution.

Understanding this distribution is critical for retailers aiming to set competitive prices and for consumers seeking value.

Calculating the Median Cost of Lamps

What Is the Median?

The median is a measure of central tendency that represents the middle value in an ordered dataset. It effectively divides the dataset into two halves: one with values below the median and one with values above it.

- If the number of data points is odd, the median is the middle value.
- If even, it is the average of the two middle values.

In the context of the stem-and-leaf plot, calculating the median involves:

1. Listing all data points in order.
2. Identifying the position of the middle value(s).
3. Computing the median accordingly.

Step-by-Step Calculation Using the Stem-and-Leaf Plot

Assuming the dataset summarized in the table above, let's proceed:

Step 1: List all data points

From the stem-and-leaf table, list all individual values:

- From "1": 15, 17, 18, 18, 19
- From "2": 20, 21, 23, 24, 25
- From "3": 30, 32, 32, 35, 37

- From "4": 40, 42, 43

Step 2: Arrange data in ascending order

Sorted list:

15, 17, 18, 18, 19, 20, 21, 23, 24, 25, 30, 32, 32, 35, 37, 40, 42, 43

Step 3: Count total data points

Total = 18

Step 4: Identify median position

Since the total number is even (18), the median is the average of the 9th and 10th values.

- 9th value: 24

- 10th value: 25

Step 5: Calculate median

Median = $(24 + 25) / 2 = 49 / 2 = 24.5$

Result: The median cost of lamps in this dataset is \$24.50.

Implications of the Median Cost in Retail and Consumer Analysis

For Retailers

- Pricing Strategy: The median indicates the typical lamp price, guiding pricing adjustments to meet consumer expectations.

- Market Positioning: If the median is lower than desired, stores might focus on premium models, or vice versa.

- Inventory Management: Recognizing common price points helps optimize stock levels and promotional strategies.

For Consumers

- Value Assessment: Consumers can compare their budget against the median to determine affordability.
- Market Trends: Changes in the median over time can reflect shifts in market pricing, inflation, or consumer preferences.

For Market Analysts

- Trend Analysis: Monitoring median changes can reveal broader economic shifts or shifts in the lamp market.
- Competitive Benchmarking: Comparing median prices across different stores or regions aids in competitive analysis.

Further Considerations and Advanced Analysis

Other Measures of Central Tendency

While the median provides a robust central value, analysts often consider:

- Mean (Average): Sum of all prices divided by the number of lamps.
- Mode: The most frequently occurring price point or range.

Understanding Distribution Shape

By inspecting the stem-and-leaf plot, one can determine whether the data is:

- Symmetrical: Median and mean are close.
- Skewed: Median and mean differ significantly, indicating skewness toward the lower or higher end.

Identifying Outliers

Outliers can distort perceptions of typical prices. For example, a lamp priced at \$100 in the dataset would be

an outlier, indicating a premium product.

Conclusion

The stem-and-leaf plot serves as an invaluable tool for visualizing and analyzing the distribution of lamp prices at a department store. Its clarity allows stakeholders to quickly ascertain the median cost, a pivotal measure of central tendency that reflects the typical price point. In our analysis, the median lamp cost was calculated at approximately \$24.50, a figure that bears significance for pricing strategies, consumer decision-making, and market trend assessment.

Understanding the median within the context of the entire price distribution provides deeper insights into market positioning and consumer preferences. Retailers can leverage this information to tailor their offerings, set competitive prices, and optimize inventory. Consumers benefit from knowing the median to gauge value and affordability.

In an era where data-driven decisions are paramount, the combination of visual tools like stem-and-leaf plots with statistical measures such as the median empowers stakeholders to navigate the complex landscape of retail pricing effectively. Future analyses might incorporate additional statistical measures, trend tracking over time, and comparative studies across different stores or regions, further enriching the understanding of the lamp market landscape.

In summary, the stem-and-leaf plot not only offers an immediate visualization of lamp prices but also facilitates precise calculation of the median, providing a cornerstone for informed decision-making in retail and consumer contexts. As markets evolve, such analytical approaches remain essential in deciphering complex data and deriving actionable insights.

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