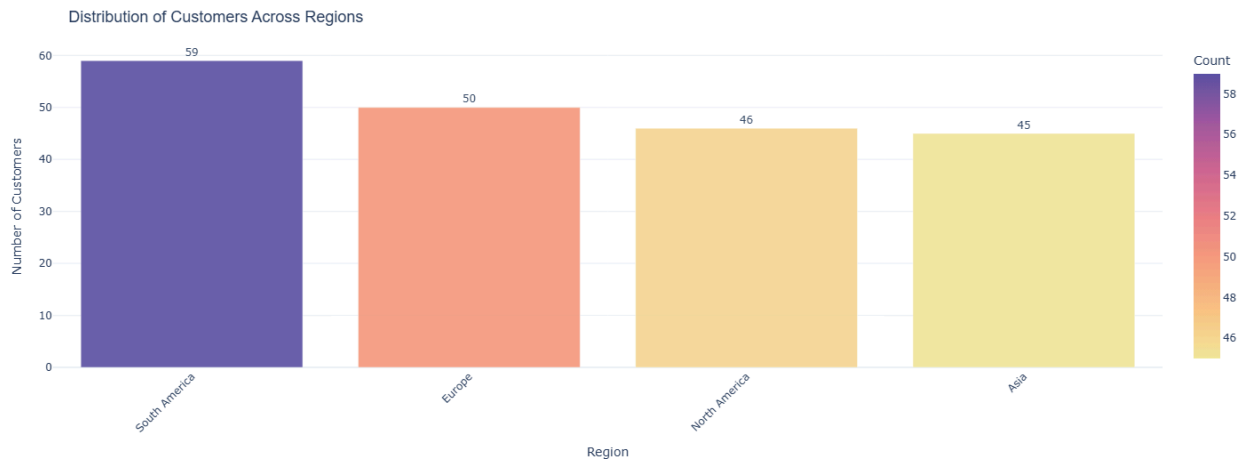# Exploratory Data Analysis (EDA) and Business Insights

Customer Data

Distribution of Customers Across Regions

- **South America Leads in Customer Count**: South America has the highest number of customers (59), indicating a strong customer base in this region.
- **Balanced Regional Distribution**: Europe, North America, and Asia have relatively similar customer counts, with minor differences (50, 46, and 45, respectively).
- **Target Potential in Asia**: Asia has the lowest customer count (45), suggesting potential for customer acquisition and market expansion in this region.

Signup Trends Over Time
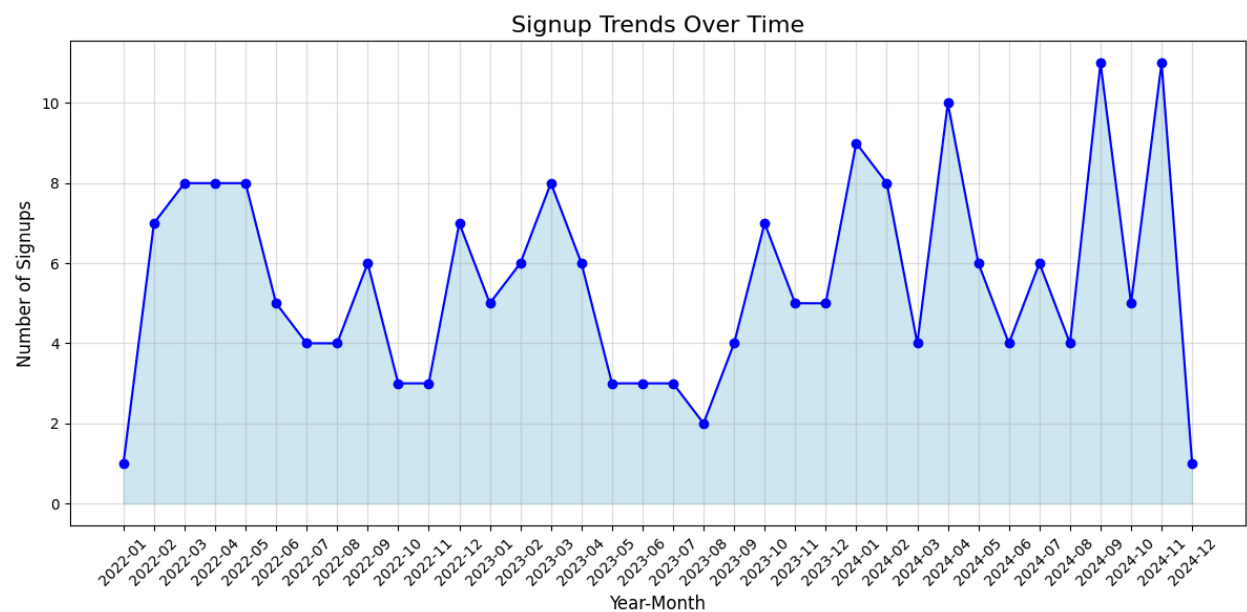
Fluctuating Signup Trends: The number of signups fluctuates significantly over time, showing periods of high activity followed by noticeable drops.

Peak Signups in Late 2024: Signups peaked around October and November 2024, indicating a possible seasonal or promotional influence during this period.

Consistent Growth in Early 2023: Early 2023 saw gradual growth in signups after a dip in late 2022, suggesting successful customer acquisition efforts during that time.

Potential Drop in Late 2024: The sharp decline in December 2024 requires investigation, possibly due to the end of campaigns or external factors.

Product Data

Product Distribution by Category
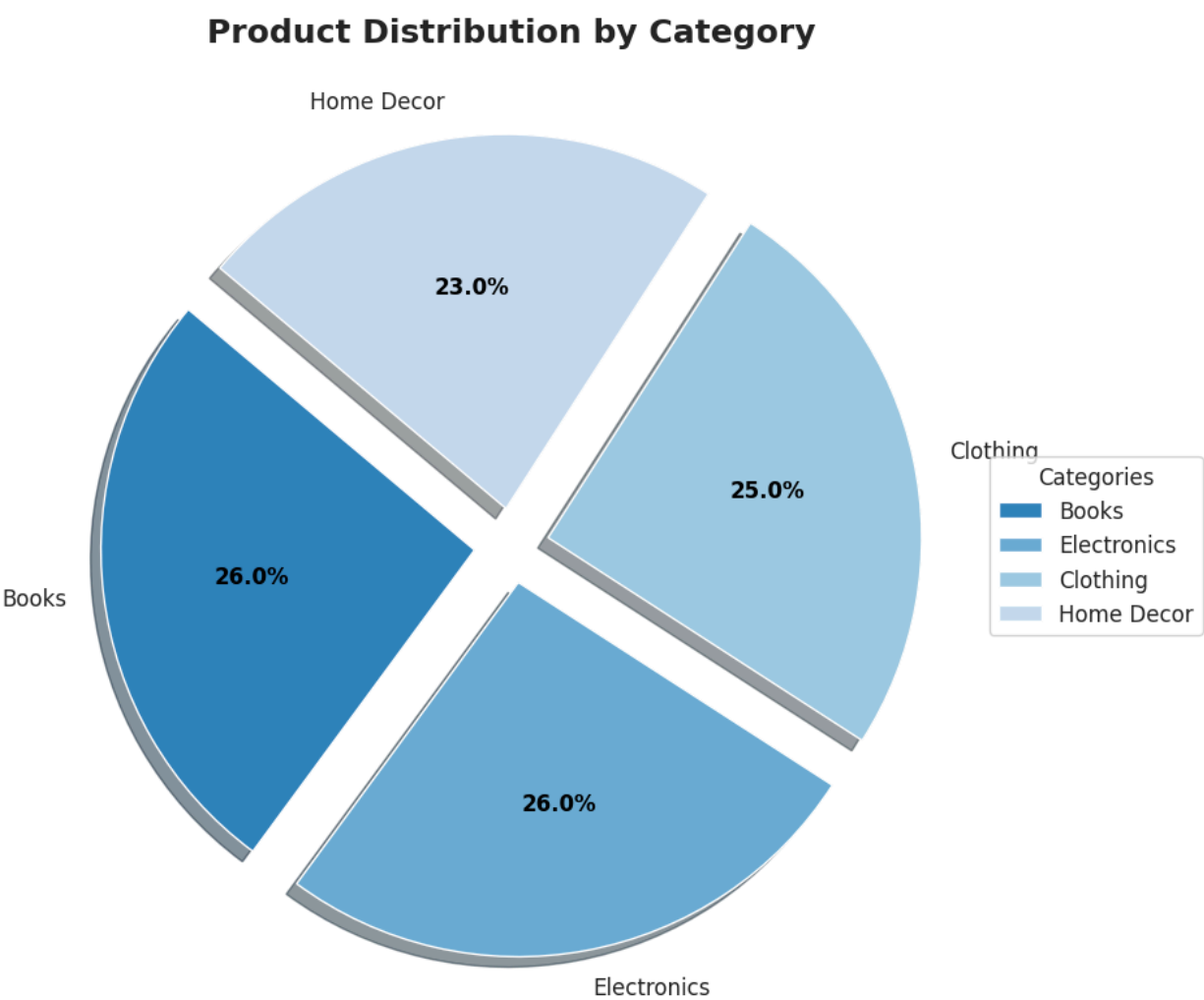
Product Distribution by Category
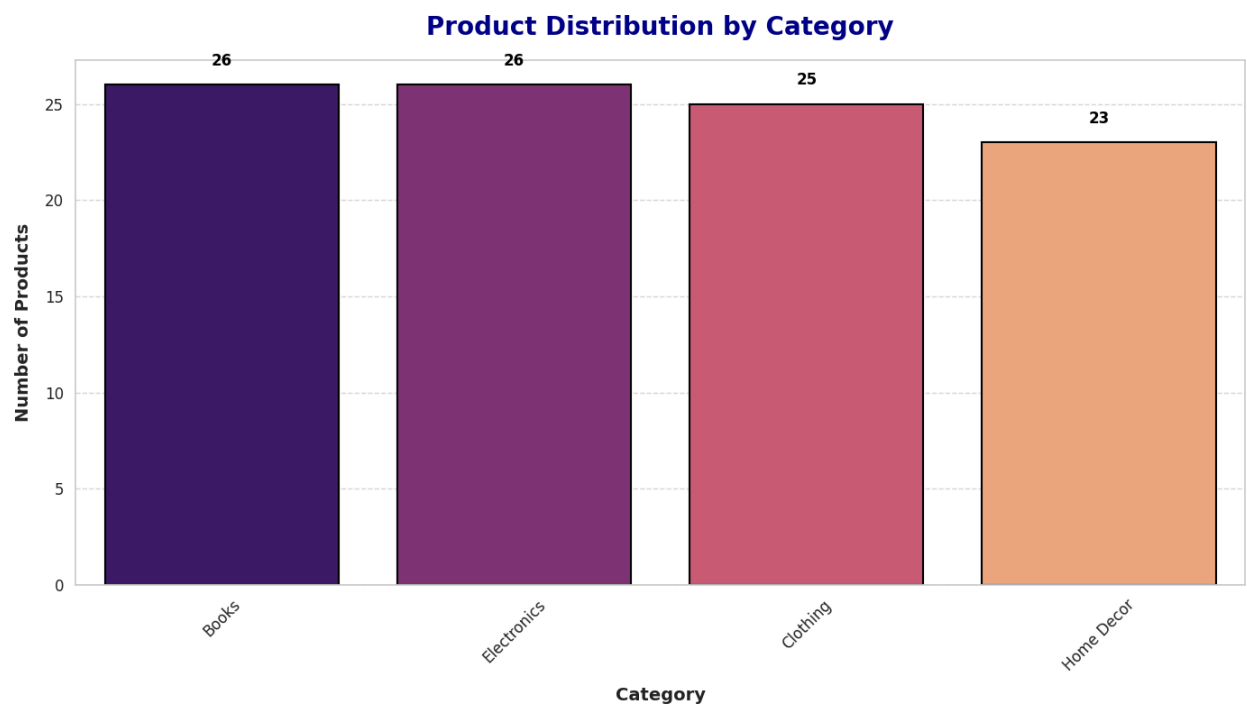
Balanced Product Categories: The distribution of products across categories is fairly balanced, with Books and Electronics having the highest count (26 each).

Clothing and Home Decor Slightly Lagging: Clothing (25) and Home Decor (23) have slightly fewer products, which might indicate an opportunity to expand these categories.

Product Variety is Well-Distributed: No significant dominance by a single category suggests a diverse product catalog appealing to a broad audience.
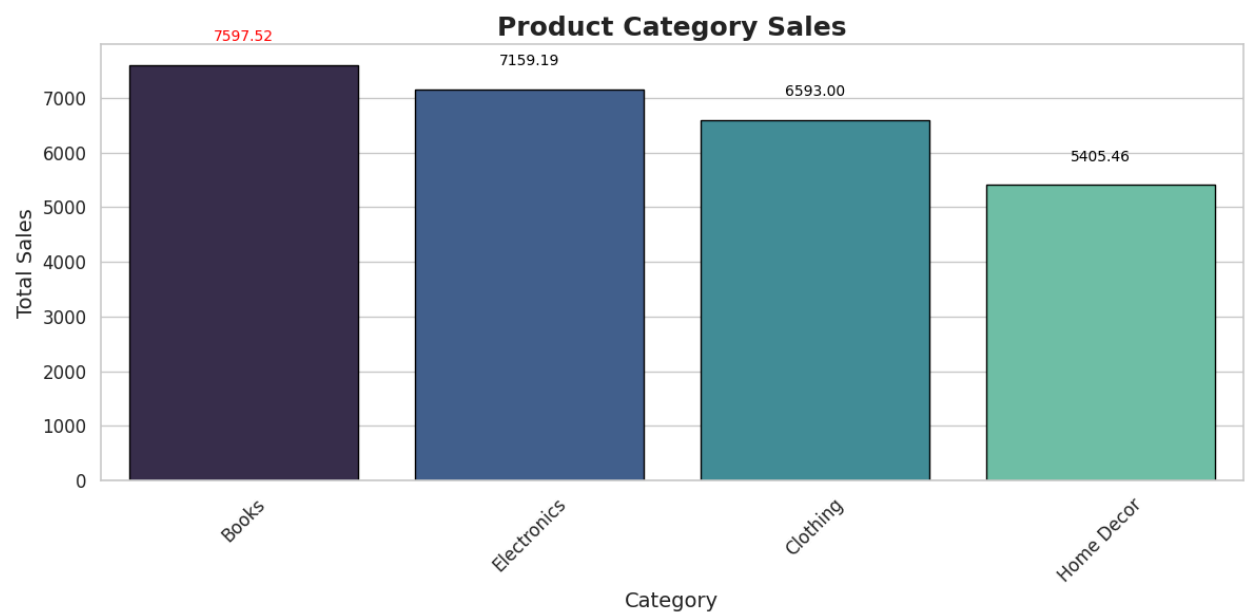
Product Distribution by Category

Product Distribution by Category

Home Decor

23.0%

Clothing

25.0%

Books

26.0%

Electronics

26.0%

Categories
- Books
- Electronics
- Clothing
- Home Decor

Books and Electronics Lead: Books and Electronics each make up 26% of the product distribution, highlighting their prominence in the catalog.

Clothing is Close: Clothing follows closely with 25%, indicating it is another strong category but slightly smaller than the top two.

Home Decor is the Smallest Category: Home Decor accounts for 23%, suggesting a potential opportunity for expansion to balance the product mix further.

Even Product Distribution: The near-even split among categories suggests the catalog is diverse, catering to various customer interests.

Product Category Sales

Product Category Sales

[Bar chart showing Total Sales by Category]

- Books: 7597.52
- Electronics: 7159.19
- Clothing: 6593.00
- Home Decor: 5405.46

Y-axis: Total Sales (0 to 7000+)
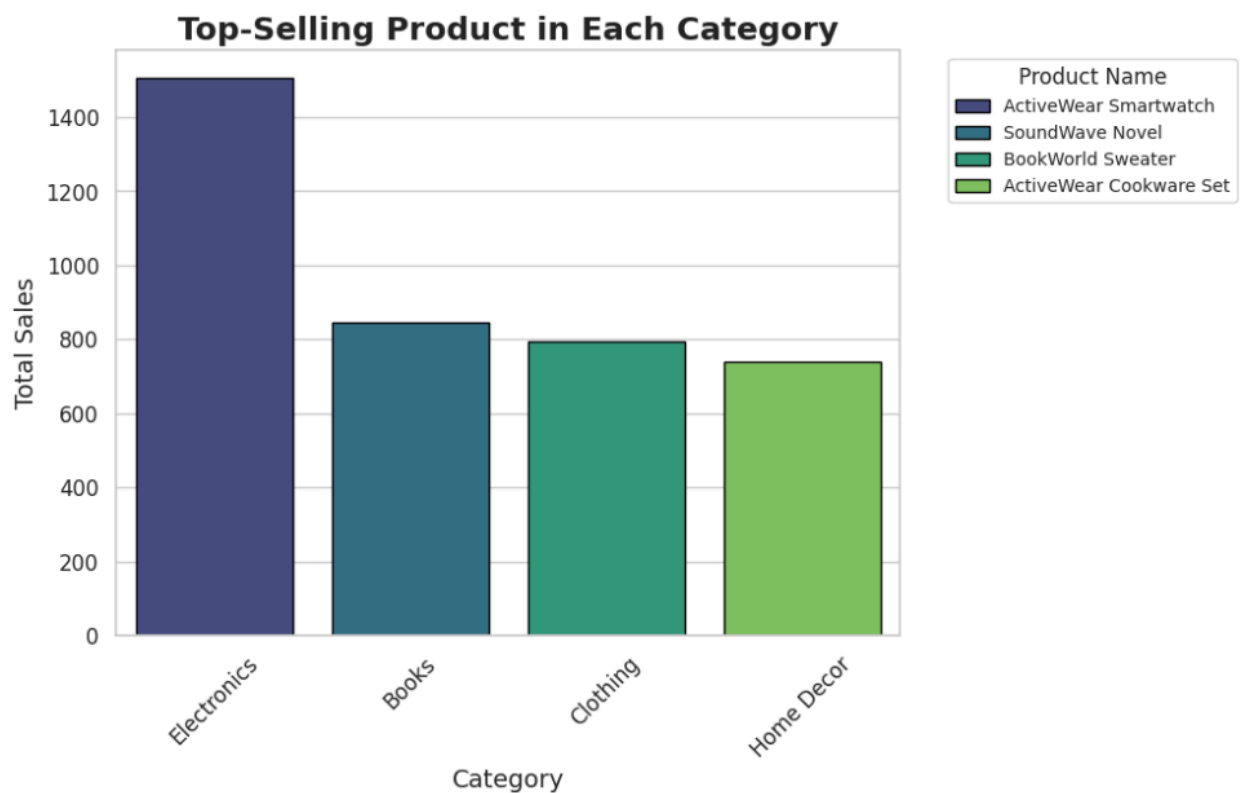X-axis: Category

Books Generate the Highest Revenue: With total sales of $7597.52, Books lead in revenue, reflecting their popularity or higher price point.

Electronics Close Behind: Electronics contribute significantly to revenue ($7159.19), making them a key category for sales focus.

Clothing and Home Decor Lag: Clothing ($6593.00) and Home Decor ($5405.46) have lower sales, indicating potential for promotions or product diversification to boost revenue.

Balanced Revenue Distribution: All categories show substantial sales, suggesting a well-diversified product catalog that supports revenue generation across different segments.

Top-Selling Product in Each Category

**Top-Selling Product in Each Category**

Electronics Dominate: The ActiveWear Smartwatch in the Electronics category leads with the highest total sales (over 1400), significantly outperforming other top-selling products.

Books and Clothing Perform Similarly: The SoundWave Novel (Books) and BookWorld Sweater (Clothing) have comparable sales, reflecting balanced demand.

Home Decor Lags Slightly: The ActiveWear Cookware Set in Home Decor has the lowest sales among top-selling products, indicating room for improvement or targeted marketing.

Electronics as a Key Revenue Driver: Electronics clearly stand out as the strongest category, potentially due to higher price points or popularity.

Average Price by Category

Average Price by Category
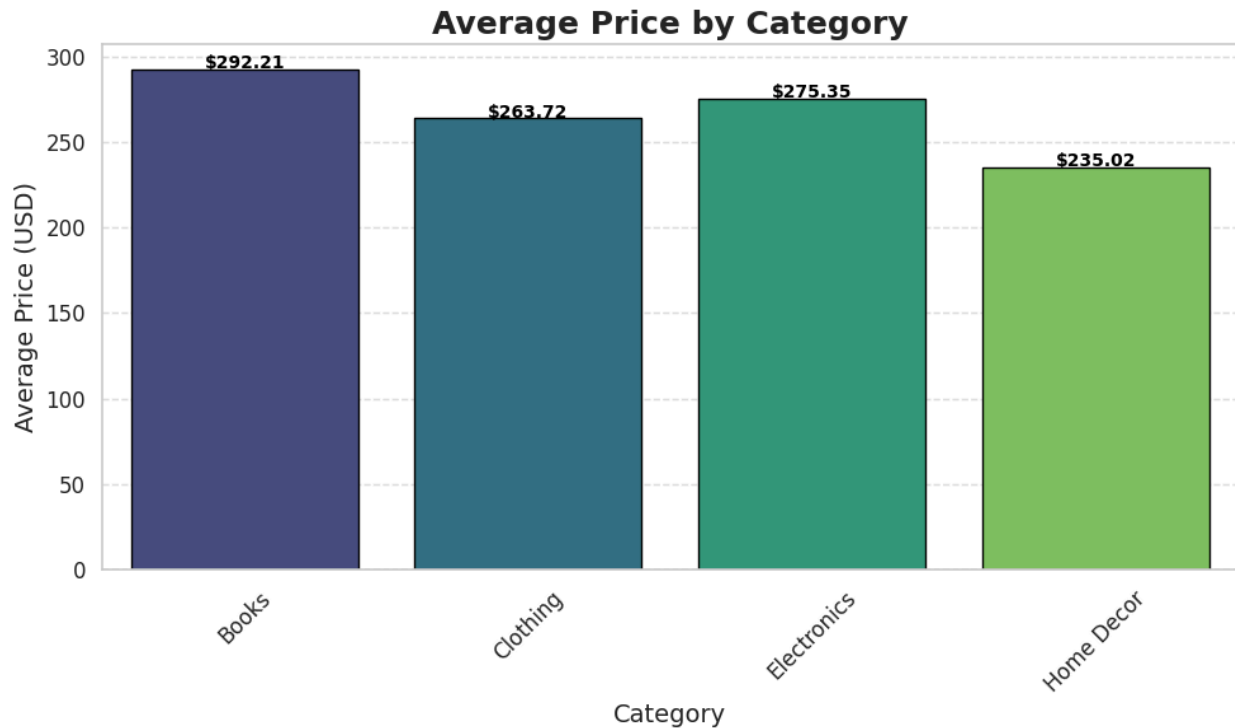
Books Have the Highest Average Price: Books lead with an average price of $292.21, indicating premium offerings in this category.

Electronics are Close Behind: Electronics have a slightly lower average price of $275.35, reflecting high-value products in this category.

Home Decor is the Least Expensive: With an average price of $235.02, Home Decor products are more affordable compared to other categories.

Clothing Offers Balanced Pricing: The average price for Clothing is $263.72, indicating a mid-range pricing strategy.
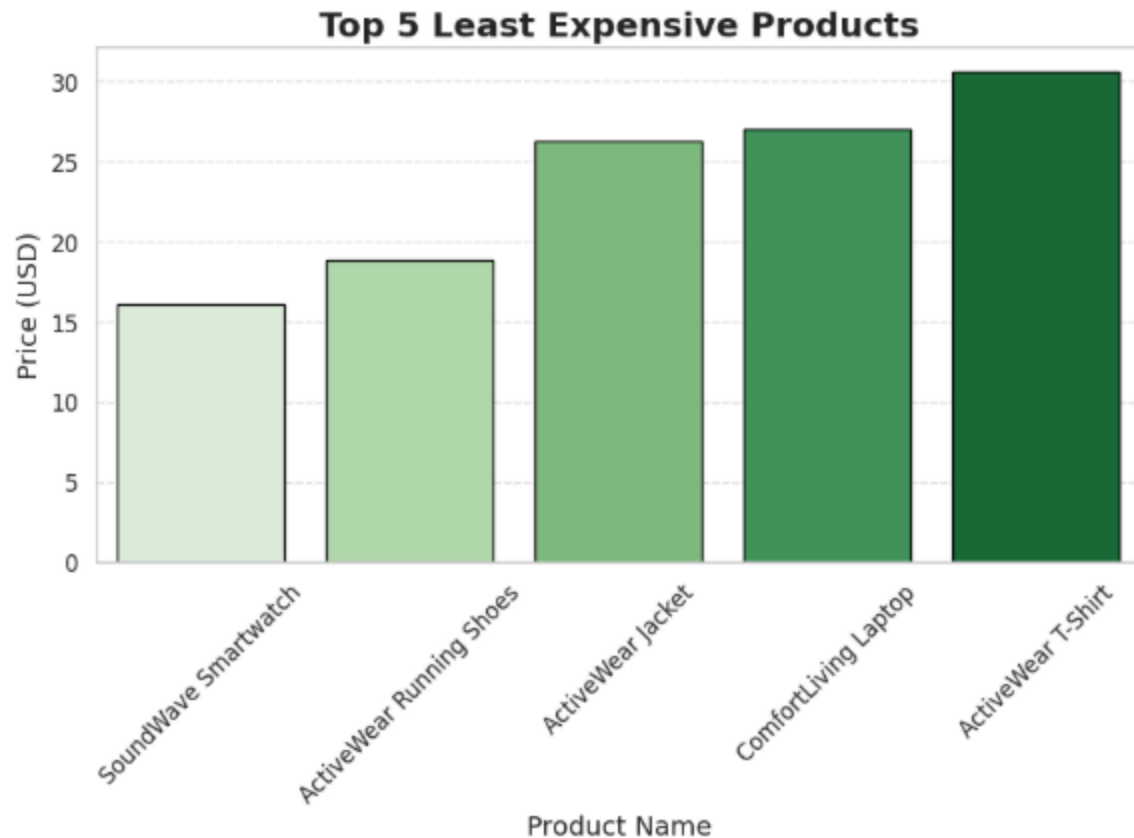
Top 5 Least & Expensive Products

Top 5 Most Expensive Products
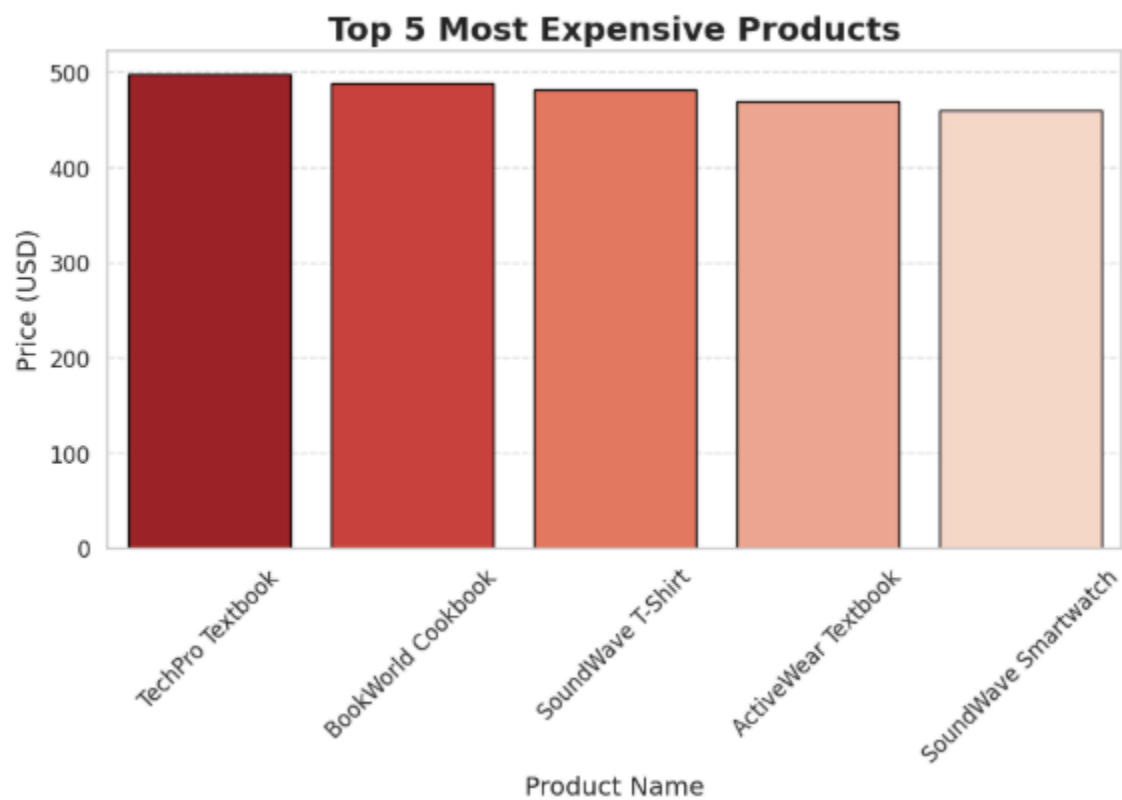
TechPro Textbook is the Most Expensive Product: Priced at nearly $500, it leads the list of high-value items.

Books Dominate High-Value Products: Three out of the top five products (TechPro Textbook, BookWorld Cookbook, ActiveWear Textbook) are books, emphasizing their premium pricing.

Diverse Product Representation: The list includes products from different categories, showcasing varied high-end offerings like the SoundWave T-Shirt and Smartwatch.

Electronics Hold Competitive Pricing: The SoundWave Smartwatch, while in the top five, is priced slightly lower than the highest-value books.

Top 5 Least Expensive Products

Affordable Products Across Categories: The least expensive products are diverse, covering items like the SoundWave Smartwatch and ActiveWear Running Shoes.

ActiveWear T-Shirt is the Most Expensive Among Low-Priced Items: Priced close to $30, it tops the least expensive product list.

SoundWave Smartwatch is the Most Affordable: With a price below $15, it represents a highly economical option.

Apparel Dominates Affordable Products: ActiveWear products (Running Shoes, Jacket, T-Shirt) make up the majority, indicating competitive pricing in this category.

# Transactions Data

Top 10 Most Purchased Products
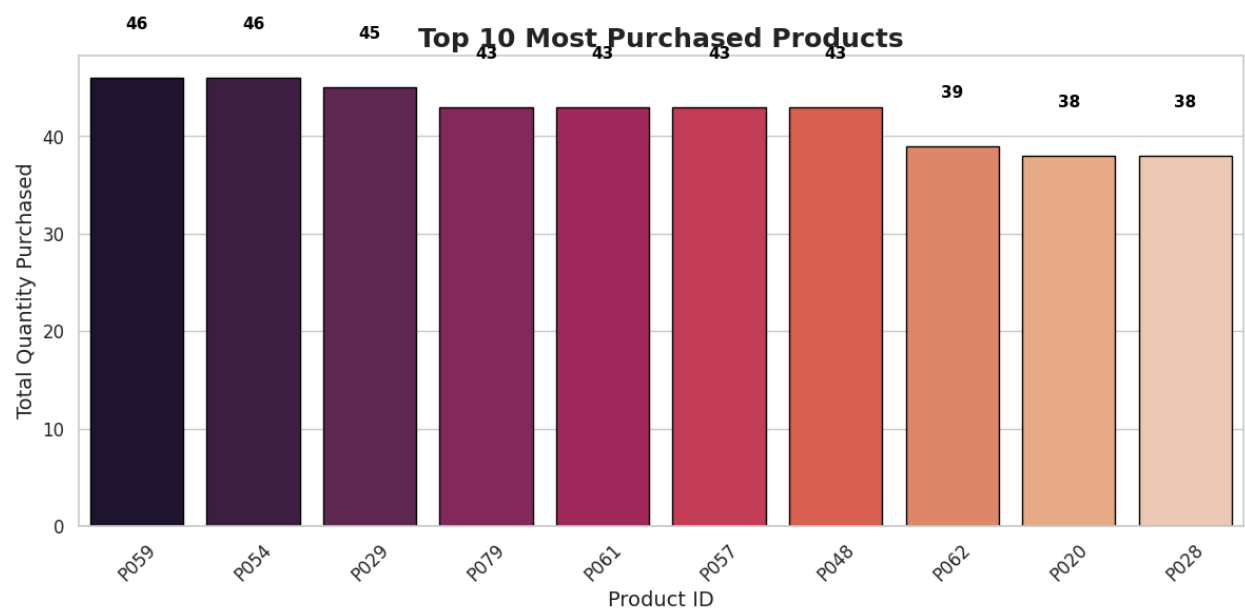
Top Two Products Share Equal Demand: Product IDs P059 and P054 lead with 46 units sold each, showcasing their popularity.

Slight Decline Among Other Products: Products P029 (45) and a group of five products (P079, P061, P057, P048) each have 43-45 units sold, reflecting strong but slightly lower demand.

Lower Range in the Top 10: Products P062, P020, and P028 conclude the list with 38-39 units sold, still making a significant contribution.

Consistently High Purchase Numbers: The top 10 products show competitive demand, with quantities ranging narrowly between 38 to 46.

Top 10 Products by Revenue
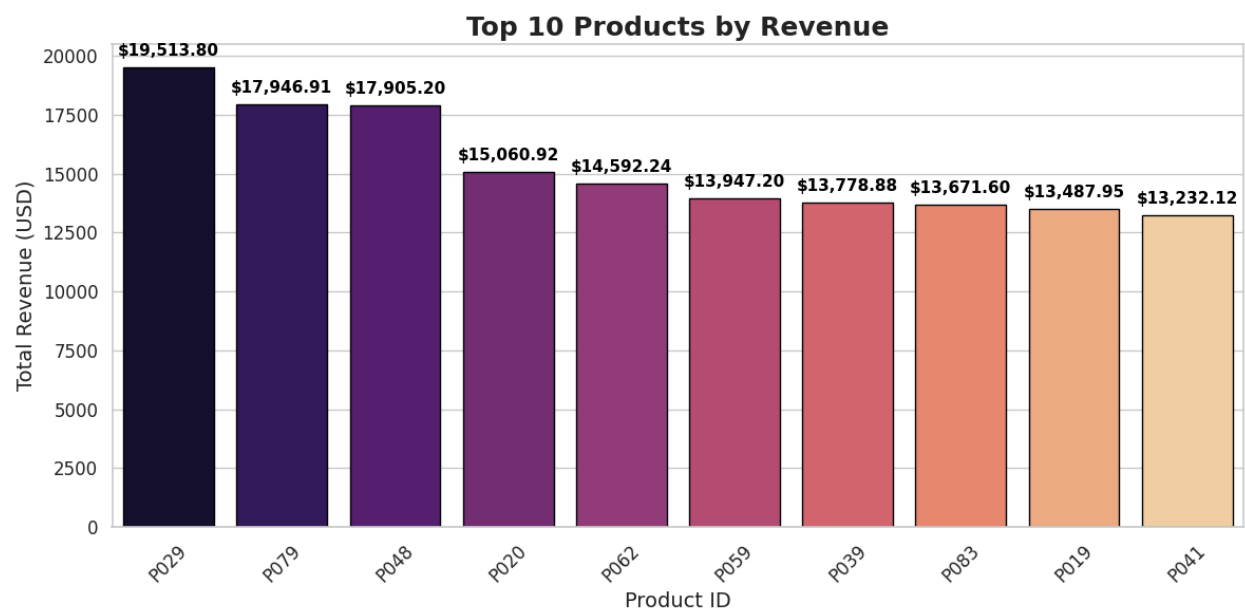
P029 is the Highest Revenue Generator: Product ID P029 leads in total revenue, generating $19,513.80, significantly ahead of others.

Close Competition Among Top Products: P079 ($17,946.91) and P048 ($17,905.20) closely follow, contributing substantially to overall sales.

Diverse Revenue Sources: The top 10 products vary widely, indicating diversified revenue streams rather than dependence on a single category.

Narrow Range in Revenue for Lower Rankings: Products like P083, P019, and P041 have similar revenues (around $13,000), reflecting balanced demand across these items.

Sales Trend Over Time
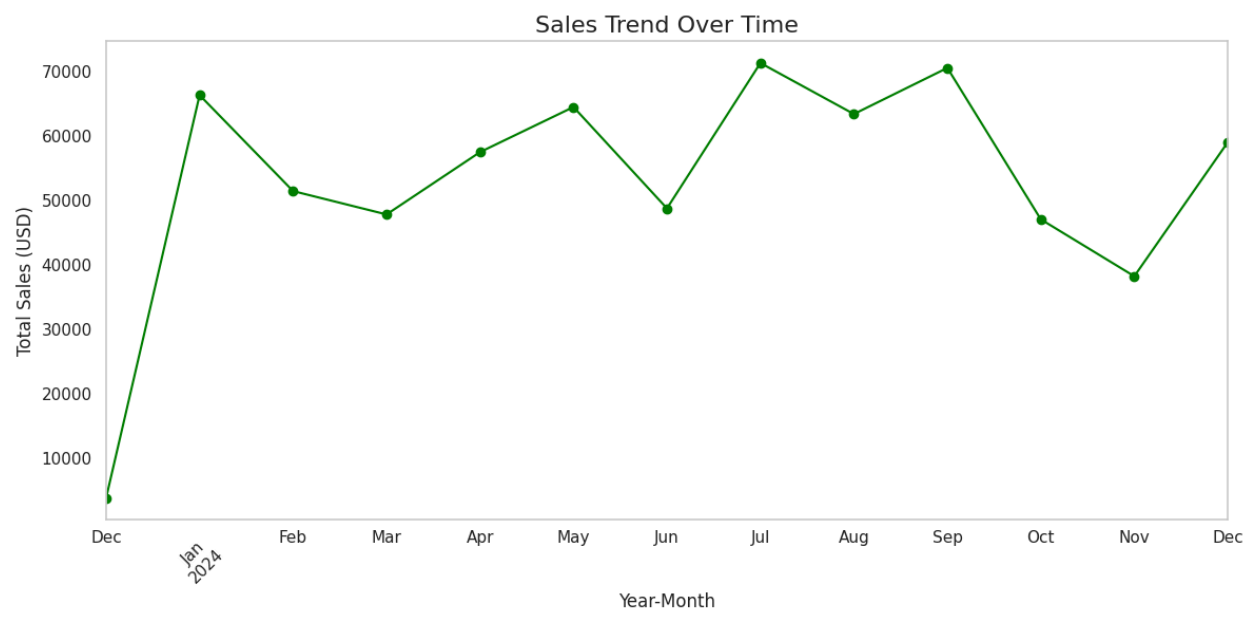
Strong Start in January 2024: January recorded the highest sales, surpassing $70,000, likely due to seasonal or promotional activities.

Mid-Year Consistency: Sales stabilized from April to August, maintaining steady performance around $50,000 to $60,000.

Sales Dip in October: A noticeable decline occurred in September and October, which could indicate reduced demand or external factors affecting performance.

Recovery in December: Sales rebounded in December, suggesting the impact of holiday shopping or end-of-year promotions driving customer activity.

Transactions by Day of the Week
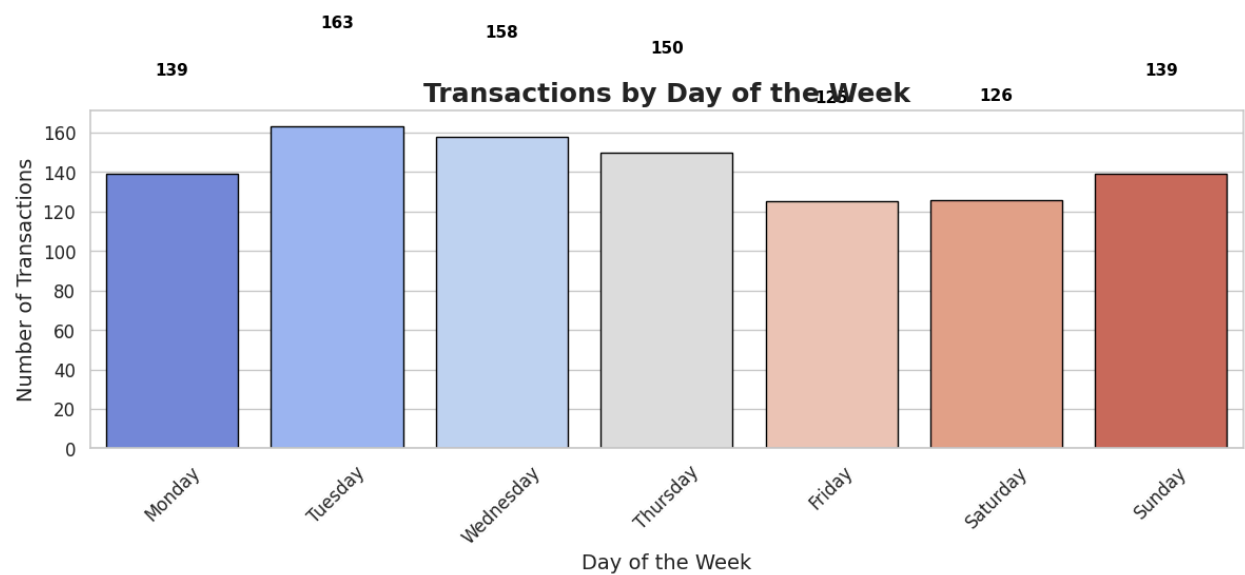
Tuesday is the Busiest Day: With 163 transactions, Tuesday sees the highest activity, indicating peak customer engagement.

Weekend Transactions are Lower: Saturday (126) and Sunday (139) have fewer transactions compared to weekdays, suggesting reduced customer activity on weekends.

Midweek Performance is Strong: Wednesday (158) and Thursday (150) also show high transaction counts, reflecting consistent engagement during weekdays.

Balanced Start and End of Week: Monday and Sunday both have 139 transactions, indicating a similar level of activity at the week's beginning and end.

Maximum Transactions by Hour of the Day
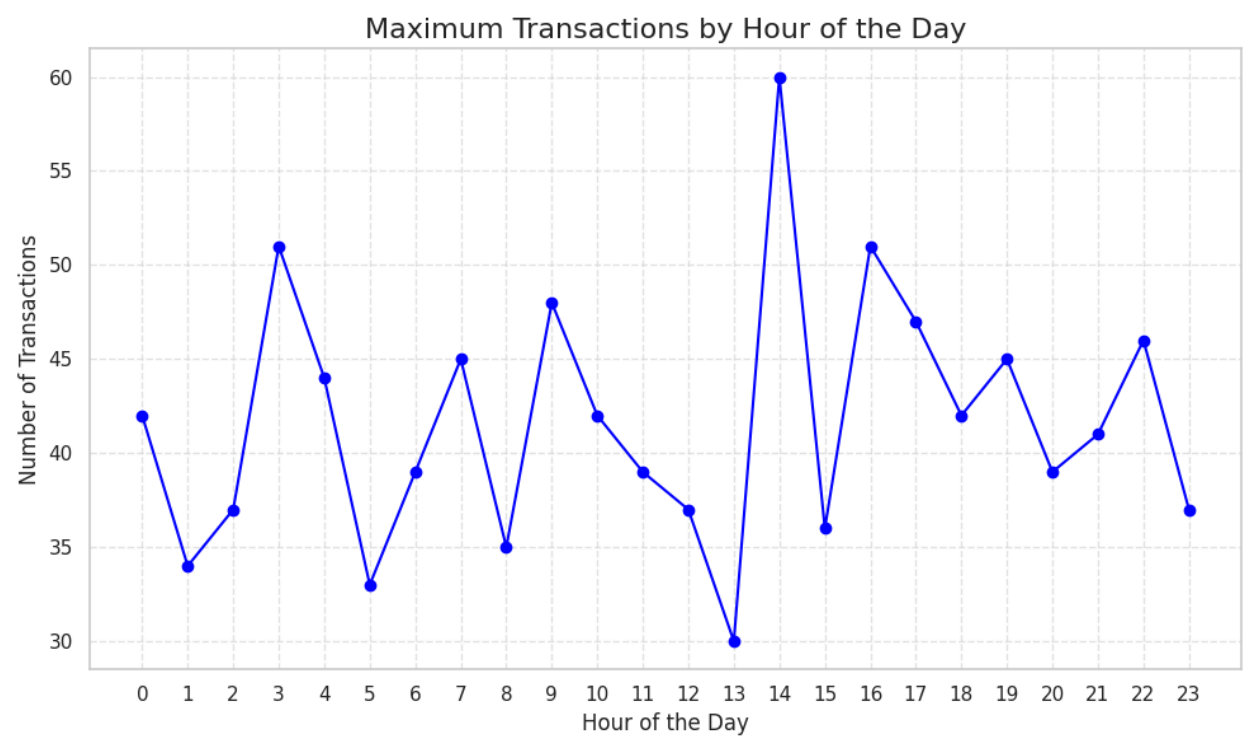
Peak Transactions at 2 PM: The highest number of transactions occurs at 2 PM, indicating this as the busiest time of day.

Early Morning and Late Night are Quieter: Transaction counts are lowest during the early morning hours (e.g., 4 AM) and late night (e.g., 11 PM).

Activity Surges in the Morning: Transactions increase significantly after 8 AM, suggesting higher customer activity during working hours.

Evening Hours are Consistent: Between 6 PM and 9 PM, transactions stabilize, reflecting steady evening shopping behavior.

Top 10 Most Frequently Purchased Products
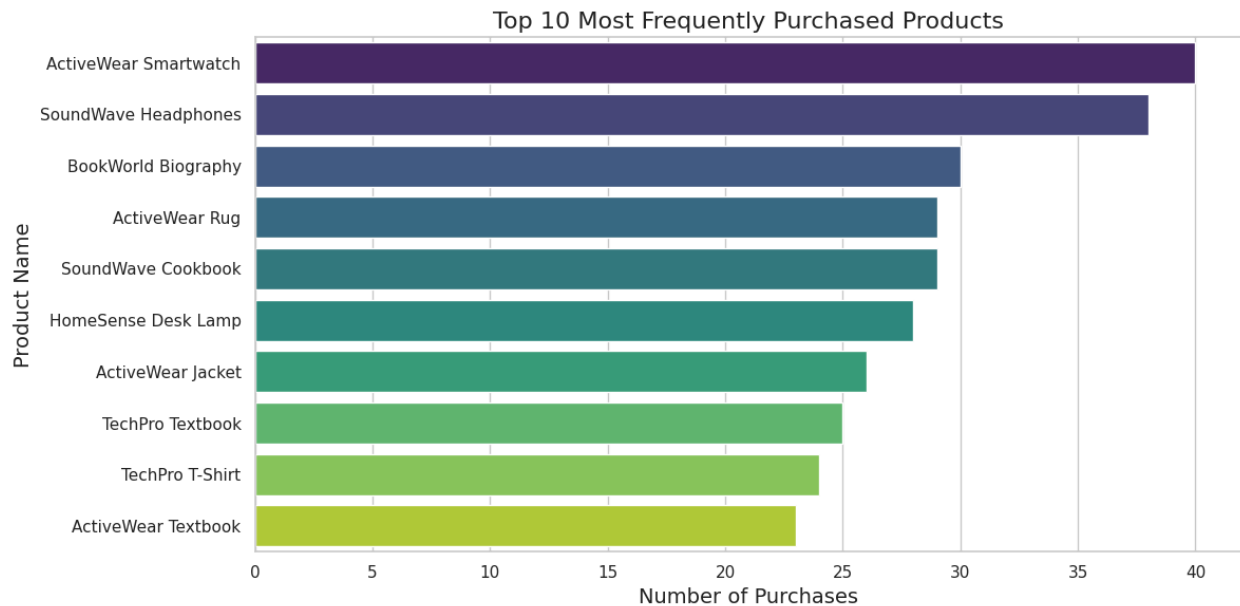
ActiveWear Smartwatch is the Most Popular: It tops the list with the highest number of purchases.

SoundWave Headphones are a Close Second: These are also very popular, nearly matching the smartwatch in purchases.

Books and Home Items are Popular: Products like BookWorld Biography and HomeSense Desk Lamp are frequently purchased.

ActiveWear Products are in Demand: Items like the Rug, Jacket, and Textbook feature prominently in the top 10.

TechPro Items Perform Well: The TechPro Textbook and T-Shirt are among the most purchased.