Question 1: Product Performance & Year-Over-Year Trends

Context: The sales team needs a report to evaluate how products are performing compared to their historical averages and how they are trending year-over-year. **Task:** Write a query that calculates:

1. **Historical Benchmark:** Compare the current year's sales against the product's average sales across all years. Label the performance as 'Above Average', 'Below Average', or 'Average'.
2. **YoY Trend:** Compare the current year's sales against the previous year's sales. Label the trend as 'Increase', 'Decrease', or 'No change'.

Required Output Columns:

- `order_year`: The year of the transaction.
- `product_name`: Name of the product.
- `current_sales`: Total sales for the current year.
- `avg_sales`: The average annual sales for the product (rounded to 2 decimals).
- `diff_avg`: The difference between current sales and average sales.
- `avg_changes`: Status label ('Above Average', 'Below Average', 'Average').
- `py_sales`: Previous year's sales (default to 0 if null).
- `diff_py`: The difference between current sales and previous year sales.
- `py_changes`: Trend label ('Increase', 'Decrease', 'No change').

Question 2: Category Revenue Contribution (Part-to-Whole)

Context: Management wants to know the revenue mix to identify which product categories drive the most value. **Task:** Write a query that calculates the total sales for each category and determines what percentage of the *overall* company sales that category represents.

Required Output Columns:

- `category`: The product category name.
- `total_sales`: Total sales amount for the category.
- `overall_sales`: The grand total of sales across all categories.
- `percentage_of_total_sales`: The percentage contribution formatted as a string (e.g., '25.50%').

Question 3: Daily Revenue Trends (Cumulative & Moving Averages)

Context: The finance team needs to track cash flow accumulation and smooth out daily sales volatility to see the underlying trend. **Task:** Write a query that:

1. Generates a continuous calendar (handling days with no sales) between the first and last order date.
2. Calculates a **Running Total** of sales from the start date.
3. Calculates a **7-Day Moving Average** (current row + 6 preceding rows).

Required Output Columns:

- `order_date`: The specific date.
- `total_sales`: Daily sales amount (0 if no sales).
- `running_total_sales`: Cumulative sum of sales over time.
- `moving_7_day_avg`: The 7-day rolling average of sales.

Question 4: Comprehensive Customer Profiling (RFM & Demographics)

Context: The marketing team requires a "Customer 360" view to segment users for targeted campaigns. **Task:** Create a detailed report that aggregates customer behavior. You must:

1. **Bucket Ages:** Group customers into age ranges (e.g., '20-29', '30-39').
2. **Segment Values:** Classify customers as 'VIP' (Active > 1 year & Sales > 5000), 'Regular', or 'New'.
3. **Calculate Metrics:** Compute Recency (days since last order), Average Order Value (AOV), and Average Monthly Spend.

Required Output Columns:

- `customer_key`: Unique customer identifier.
- `customer_number`: Customer business ID.
- `full_name`: Customer's full name.
- `customer_age`: Age in years.
- `age_group`: The age bracket label.
- `customer_segment`: The loyalty segment ('VIP', 'Regular', 'New').
- `total_order`: Count of distinct orders.
- `total_sales`: Sum of all sales.
- `total_quantity`: Total items purchased.
- `total_products`: Count of unique products purchased.
- `last_order_date`: Date of the most recent order.
- `recency`: Days elapsed since the last order.
- `life_span`: Months active (first to last order).
- `avg_order_value`: Average value per order.
- `avg_monthly_spend`: Average value spent per month of lifespan.

Question 5: Inventory Cost Segmentation

Context: We need to analyze our product catalog's pricing structure to understand inventory distribution. **Task:** Segment products into cost ranges ('Below 100', '100-500', '500-1000', 'Above 1000') and count how many products exist in each tier.

Required Output Columns:

- `cost_range`: The price bucket label.
- `total_products`: The count of products in that range.

Question 6: Customer Base Segmentation Summary

Context: Following the customer profiling, we need a high-level summary of our customer base composition. **Task:** Using the logic from Question 4 (VIP/Regular/New), count how many unique customers fall into each segment.

Required Output Columns:

- `customer_segment`: The segment label.
- `total_customers`: The number of customers in that segment.

Question 7: Month-Over-Month Growth Analysis

Context: Executives need to track monthly momentum. **Task:** Calculate the Month-Over-Month (MoM) growth rate for sales.

1. Aggregate sales by month.
2. Compare the current month's sales to the previous month's sales using a window function.
3. Calculate the percentage growth.

Required Output Columns:

- `sales_month`: The month (YYYY-MM).
- `current_month_sales`: Total sales for the month.
- `previous_month_sales`: Total sales for the prior month.
- `growth_rate`: The percentage growth or decline (e.g., 5.25 or -2.00).