**Part 1: Monthly Active Users (MAU)**

To calculate the MAU, we will count the number of unique users who have performed any activity each month.

**Part 2: Retention Rate**

To calculate the retention rate, we will:

1. Identify new users in each month.
2. Check if these new users have any activity in the subsequent month.
3. Calculate the percentage of these new users who return in the following month.

**Part 3: Average Monthly Activities per User**

To calculate the average number of activities per active user for each month, we will:

1. Count the total number of activities in each month.
2. Divide this by the number of unique active users in that month.

**Part 4: Top 3 Popular Products by Views**

To identify the top 3 products each month by the number of unique users who viewed them, we will:

1. Filter activities to only include 'view\_product'.
2. Rank the products based on the number of unique viewers.

**Explanation of Each Step**

1. **user\_activities**: Extracts user activities with a truncated month for grouping.
2. **monthly\_active\_users**: Calculates the number of unique active users (MAU) each month.
3. **new\_users**: Identifies the first month each user performed any activity.
4. **monthly\_retention**: Counts new users each month and those who returned the following month.
5. **monthly\_retention\_rate**: Calculates the retention rate.
6. **monthly\_activities**: Counts total activities and active users each month.
7. **avg\_monthly\_activities**: Calculates the average number of activities per user.
8. **product\_views**: Counts unique views for each product by month.
9. **ranked\_products**: Ranks products by unique views for each month.
10. **top\_3\_products**: Filters to get the top 3 products by views each month.
11. **Final SELECT**: Joins all the intermediate results and formats the output.

This query provides a comprehensive analysis of user engagement and retention, including MAU, retention rates, average activities per user, and the top 3 viewed products each month.