Insights drawn from the entire Uber EDA analysis

1. **Data Understanding & Preparation**

- The dataset contains **6,745 Uber ride requests** with variables such as Request id, Pickup point (City or Airport), Driver id, Status (Trip Completed, Cancelled, No Cars Available), and timestamps for request and drop.

- There are **no duplicate records**, ensuring data integrity for the analysis.

- Significant **missing values** appear in Driver id (for requests without assigned drivers) and Drop timestamp (for incomplete or failed trips). These patterns themselves are insightful, closely linked to operational challenges like cancellations and unmet demand.

Data Wrangling Steps:

- Timestamps were **converted to datetime** format, allowing for robust time-based analysis.

- **Missing 'Driver id'** was set to 0, denoting trips without an assigned driver (unfulfilled requests).

- Extracted the **hour from request times** to analyze temporal demand fluctuations.

- All other columns were validated to ensure readiness for deeper exploration.

2. **Variable Exploration & Initial Insights**

- **Pickup point:** Two unique values, Airport and City; requests are almost evenly split between these two, showing both are high-demand zones.

- **Status:** Three outcomes—Trip Completed, Cancelled, or No Cars Available—directly reveal ride fulfillment efficiency.

- **Driver id:** Range from 1 to 300, with substantial variance in assignment. Many requests lack a driver, correlating to failed trips.

- **Timestamps:** Over 5,600 unique request times; trips cluster by hour, revealing commuter-based patterns.

3. **Operational Patterns & Challenges Identified**

A. **Fulfillment Gaps**

- **Trip Completion Rate:** Out of 6,745 requests, only 2,831 were completed. Over 55% of requests ended either in cancellations or "No Cars Available," indicating a critical supply-demand mismatch.

- **Location-Specific Issues:**

  - **City:** More likely to suffer from cancellations.

  - **Airport:** Dominated by "No Cars Available" responses, often during evening hours.

- **Temporal Patterns:**

  - **Peak demand hours:** Late evening (especially at the Airport) faces intense shortfalls between demand and available cars.

- **High cancellation period:** City area mornings signal a problem with either driver supply or customer patience.


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Distribution of Failed Trips by Pickup Point and Hour

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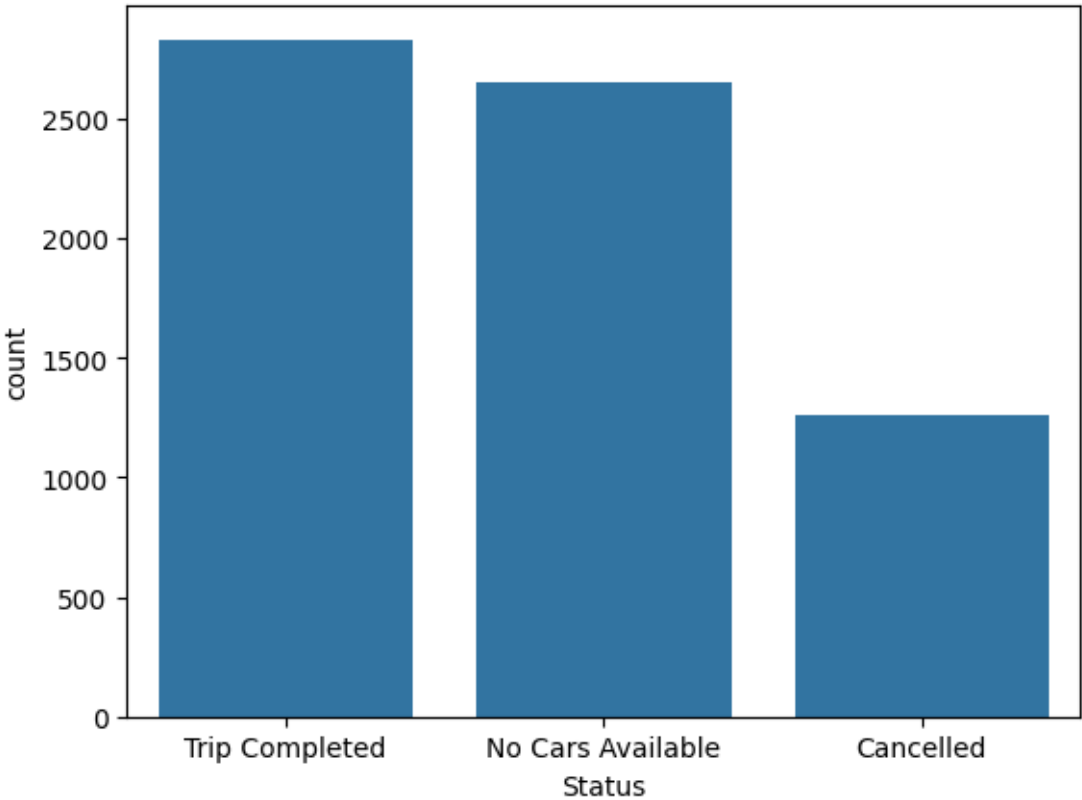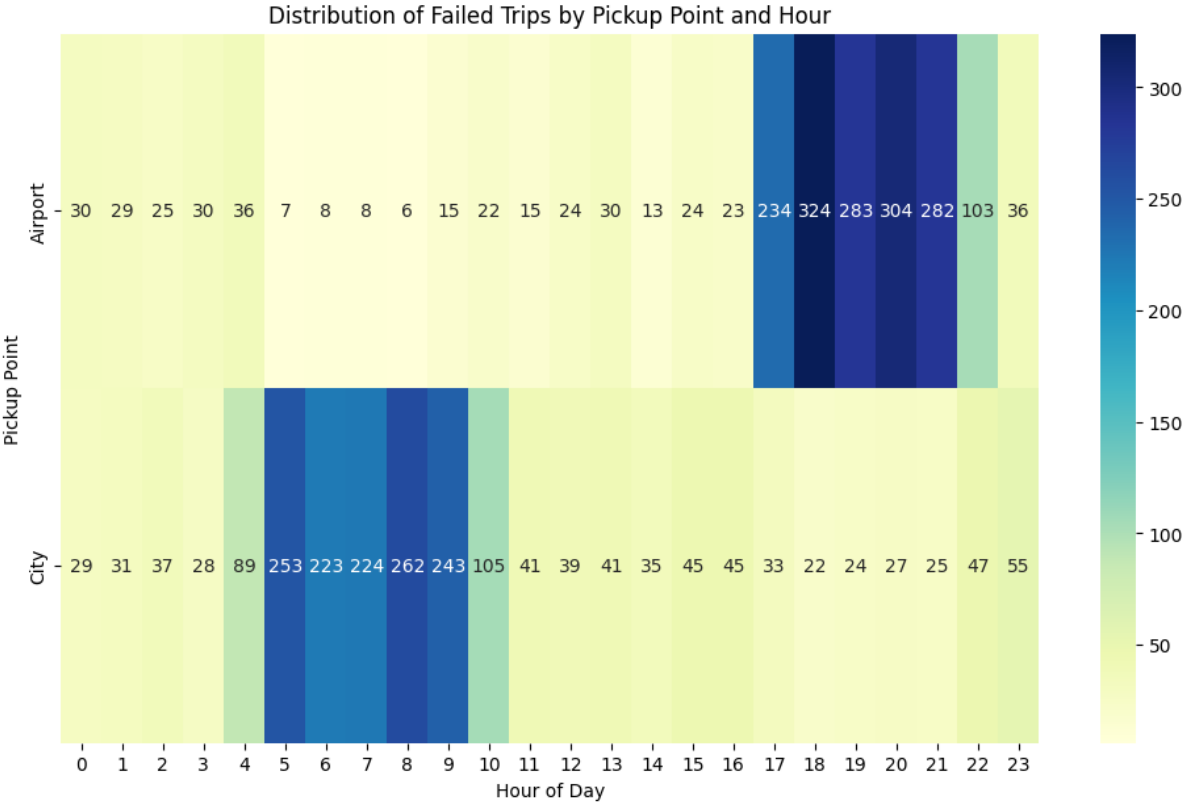
B. **Driver Utilization & Customer Experience**

- The **top 20 drivers** far outperform others in completed trips, with a long tail of less active or underperforming drivers.

- The **majority of completed trips** are of short duration, with few outliers. This could inform route optimization, pricing, or carpooling options.

Number of Completed Trips per Driver (Top 20)

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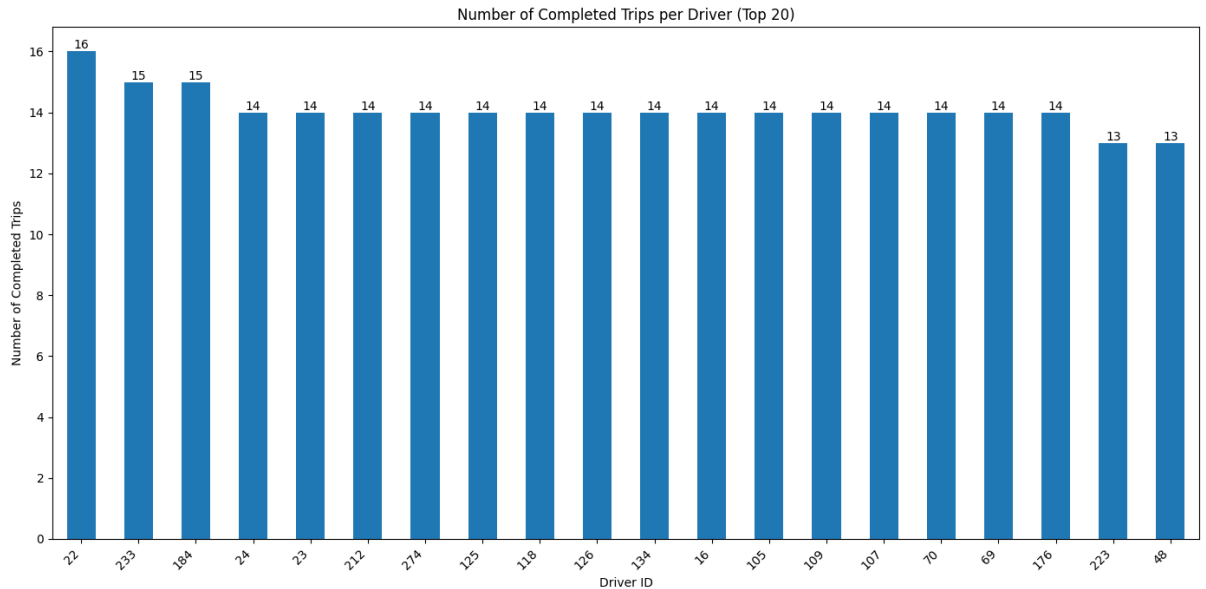
4. **Root Causes & Business Implications**

- **Cancellations and No Cars:** The patterns suggest two fronts for business intervention—

  - At the **Airport**, demand so greatly outpaces supply in the evenings that many rides simply fail to start.

  - In the **City**, frequent cancellations may relate to estimated driver arrival times, traffic, or app behavior.

- **Driver resource allocation** and incentive programs need to be fine-tuned both by location and by time of day.

- **Dynamic pricing or real-time demand prediction** could better match driver supply with commuter peaks for more ride completions.

Trip Status Breakdown by Hour

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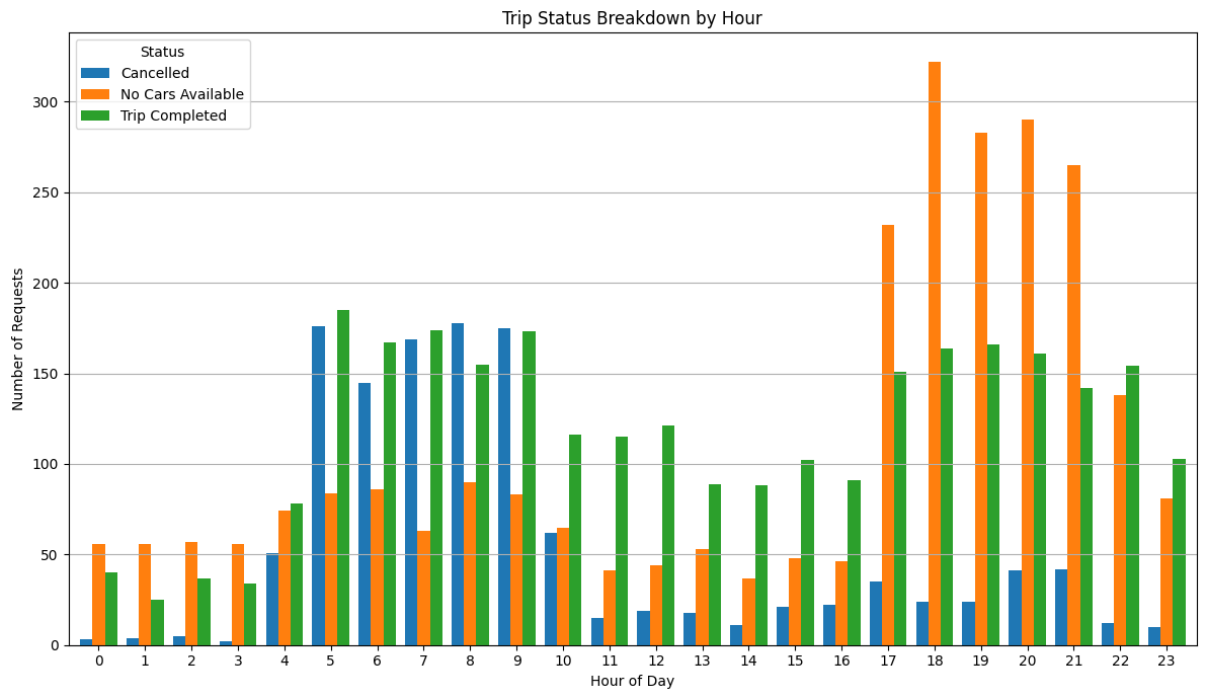
5. **Strategic Recommendations**

- **Increase driver supply** at Airport during evening peaks—use real-time data and tailored financial incentives.

- **Investigate cancellations** in City during morning hours—identify root causes (e.g., driver delays, passenger drop-offs) and refine driver/passenger matching.

- **Continuous monitoring** to identify emergent gaps—potential for machine learning solutions that forecast demand by zone/hour.

- **Driver performance review, training, and rewards**—raise the tail end of the driver performance curve and recognize top contributors.

6. **Conclusion**

The Uber EDA uncovers deep **inefficiencies in matching supply to demand**, especially during critical hours and key locations. Data-driven interventions—driver incentives, dynamic pricing, better demand prediction, and focused investigation into cancellation root causes—can substantially improve both the customer and driver experience while growing fulfillment rates and revenue.