**Business Statistics for Decision Making**

**April 2025 Examination**

**1. The management of Swift Rides Pvt. Ltd., a ride-sharing service, wants to understand the factors affecting the Average Daily Rides across their network. They hypothesize that three key variables drive the number of daily rides: Average Daily Active Users, Surge Pricing (Average Multiplier), and Weather Conditions (coded as 1 for adverse weather like rain or snow, and 0 for normal weather). The company has collected monthly data over the last three years.**

**Table 1: Data Set**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Period** | | **Average Daily**  **Rides** | | **Average Daily**  **Active Users** | | **Surge Pricing**  **(Avg. Multiplier)** | | | **Weather Conditions**  **(1-Adverse, 0-Normal)** |
| **Jan-21** | | **12,500** | | **25,000** | | **1.5** | | | **1** |
| **Feb-21** | | **14,000** | | **27,000** | | **1.2** | | | **0** |
| **Mar-21** | | **13,800** | | **26,800** | | **1.4** | | | **0** |
| **Apr-21** | | **12,200** | | **24,500** | | **1.6** | | | **1** |
| **May-21** | | **11,700** | | **23,000** | | **1.7** | | | **1** |
| **Jun-21** | | **14,300** | | **28,000** | | **1.2** | | | **0** |
| **Jul-21** | | **15,000** | | **29,500** | | **1.3** | | | **0** |
| **Aug-21** | | **13,500** | | **27,000** | | **1.5** | | | **1** |
| **Sep-21** | | **12,900** | | **26,200** | | **1.4** | | | **1** |
| **Oct-21** | | **14,800** | | **28,500** | | **1.3** | | | **0** |
| **Nov-21** | | **13,200** | | **26,000** | | **1.4** | | | **1** |
| **Dec-21** | | **11,900** | | **24,500** | | **1.6** | | | **1** |
| **Jan-22** | | **12,600** | | **25,500** | | **1.5** | | | **1** |
| **Feb-22** | | **14,500** | | **27,500** | | **1.2** | | | **0** |
| **Mar-22** | | **13,900** | | **27,000** | | **1.4** | | | **0** |
| **Apr-22** | | **12,800** | | **24,800** | | **1.6** | | | **1** |
| **May-22** | | **11,800** | | **23,200** | | **1.7** | | | **1** |
| **Jun-22** | | **14,700** | | **28,800** | | **1.2** | | | **0** |
| **Jul-22** | | **15,300** | | **30,000** | | **1.3** | | | **0** |
| **Aug-22** | | **13,700** | | **27,200** | | **1.5** | | | **1** |
| **Sep-22** | | **13,100** | | **26,500** | | **1.4** | | | **1** |
| **Oct-22** | | **14,900** | | **29,000** | | **1.3** | | | **0** |
| **Nov-22** | | **13,300** | | **26,300** | | **1.4** | | | **1** |
| **Dec-22** | | **12,000** | | **24,700** | | **1.6** | | | **1** |
| **Jan-23** | | **12,700** | | **25,700** | | **1.5** | | | **1** |
| **Feb-23** | | **14,600** | | **27,700** | | **1.2** | | | **0** |
| **Mar-23** | | **14,000** | | **27,200** | | **1.4** | | | **0** |
| **Apr-23** | | **12,900** | | **25,000** | | **1.6** | | | **1** |
| **May-23** | | **12,000** | | **23,500** | | **1.7** | | | **1** |
| **Jun-23** | | **14,800** | | **29,000** | | **1.2** | | | **0** |
| **Jul-23** | | **15,400** | | **30,500** | | **1.3** | | | **0** |
| **Aug-23** | | **13,800** | | **27,500** | | **1.5** | **1** | | |
| **Sep-23** | | **13,200** | | **26,800** | | **1.4** | **1** | | |
| **Oct-23** | | **14,700** | | **28,800** | | **1.3** | **0** | | |
| **Nov-23** | | **13,400** | | **26,500** | | **1.4** | **1** | | |
| **Dec-23** | | **12,100** | | **25,000** | | **1.6** | **1** | | |

**On the basis of data given in Table 1, compute the correlation of Average Daily Rides with each independent variable. Perform a multiple regression analysis using the data. Provide insights based on the following metrics:**

**• Adjusted R-square.**

**• Multiple R**

**• ANOVA results (significance of variables) (10 Marks)**

#### **Ans 1.**

#### **Introduction**

Understanding the factors influencing business operations is crucial for effective decision-making. Swift Rides Pvt. Ltd., a ride-sharing company, aims to analyze the impact of key factors on its Average Daily Rides. The three primary variables considered are Average Daily Active Users, Surge Pricing (Average Multiplier), and Weather Conditions (categorized as 1 for adverse conditions and 0 for normal conditions). By performing correlation analysis and multiple regression, we assess how these factors contribute to the fluctuation in daily rides. This statistical evaluation helps in optimizing pricing strategies, user engagement, and operational adjustments based on weather conditions. The study

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**2. On the basis of the data given in Table 1:**

**• Compute the measures of central tendency of Average Daily Rides, Average Daily**

**Active Users, and Surge Pricing (Average Multiplier).**

**• Compute the standard deviations of these 3 variables.**

**• Construct the histogram for each of these three variables, and comment on their skewness.**

**(10 Marks)**

**Ans 2.**

#### **Introduction**

Statistical analysis plays a crucial role in understanding business trends and making data-driven decisions. Swift Rides Pvt. Ltd., a ride-sharing company, wants to analyze the central tendency and distribution of key variables, including **Average Daily Rides, Average Daily Active Users, and Surge Pricing (Average Multiplier)**. The goal is to understand the nature of the dataset, its dispersion, and skewness, which will help in making strategic decisions.

By computing **measures of central tendency** (mean, median, and mode), we identify the typical values of each variable. Additionally, by calculating **standard deviation**, we

**3. Cura Pharmaceuticals Ltd., a distributor of prescription drugs, manages inventory for a critical medication used in hospitals. The company has observed that demand during the lead time (the time between placing an order with the supplier and receiving the stock) is normally distributed with a mean of 500 units and a standard deviation of 120 units. To avoid shortages in critical situations, the company places a reorder when the inventory falls to 600 units. However, there have been instances of stock-outs, which the management is keen to address.**

**a. What is the probability of a stock-out (i.e., demand during lead time exceeding 600 units)? (5 Marks)**

#### **Ans 3a.**

#### **Introduction**

Cura Pharmaceuticals Ltd. manages the inventory for a critical medication used in hospitals. The company follows a standard practice of placing a reorder when inventory falls to **600 units**. However, since demand during the lead time follows a normal distribution with a **mean of 500 units** and a **standard deviation of 120 units**, stock-outs sometimes occur. A stock-out happens when demand exceeds 600 units before replenishment. To assess the likelihood of a stock-out, we calculate the probability that demand exceeds 600 units during

**b. The management wants to ensure the probability of a stock-out is no more than 5%. What should the reorder point be (i.e., what should the inventory level be when the company places a reorder)? (5 Marks)**

#### **Ans 3b.**

#### **Introduction**

Cura Pharmaceuticals Ltd. wants to limit the stock-out probability to 5%. This means that demand during lead time should exceed the reorder point in only 5% of cases. We need to determine the optimal reorder point that ensures this requirement while maintaining inventory efficiency. This calculation is based on the inverse normal distribution, which allows us to find the demand level corresponding to a 5% probability in the upper tail of the