**Business Statistics for Decision Making**

**NMIMS Centre for Distance and Online Education (NCDOE)**

**Internal Assignment Applicable for 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)**

**Answer:**

**Introduction:**

Swift Rides Pvt. Ltd. aims to analyze the factors influencing its Average Daily Rides by examining three key independent variables: Average Daily Active Users, Surge Pricing (Average Multiplier), and Weather Conditions. By computing correlation coefficients, the strength of the relationship between each variable and daily rides can be assessed. A multiple regression analysis will further help quantify how these variables collectively impact ride demand. Key statistical metrics such as Adjusted R-Square, Multiple R, and ANOVA results will provide insights into model accuracy and the significance of each factor. Understanding these relationships will help Swift Rides optimize strategies, such as user engagement and dynamic pricing, to improve ride volume. The findings will guide data-driven decision-making for business growth.

**This is partially solved sample answer**

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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.**

**Answer:**

**Introduction:**

Swift Rides Pvt. Ltd. seeks to analyze key statistical properties of its ride-sharing data to understand trends and variability. Measures of central tendency (mean, median, and mode) will be computed for Average Daily Rides, Average Daily Active Users, and Surge Pricing (Average Multiplier) to determine typical values. Additionally, standard deviation will be calculated to assess the dispersion of data points around the mean. Histograms for each variable will be plotted to visualize distribution patterns, and their skewness will be examined to understand asymmetry in data. This analysis will help identify patterns in ride demand, user activity, and pricing fluctuations, allowing Swift Rides to make data-driven operational and pricing decisions for improved business performance.

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**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)?**

**Answer:**

**Introduction:**

Cura Pharmaceuticals Ltd. wants to ensure uninterrupted supply of a critical medication by managing its inventory effectively. The company reorders stock when inventory falls to 600 units, but occasional stock-outs have raised concerns. Since demand during lead time follows a normal distribution with a mean of 500 units and a standard deviation of 120 units, the probability of a stock-out can be calculated using z-scores and the standard normal distribution. This analysis will help the company make informed decisions to minimize supply risks.

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**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)?**

**Answer:**

**Introduction:**

Cura Pharmaceuticals Ltd. aims to minimize stock-outs of a critical medication by adjusting its reorder point. Currently, the reorder level is set at 600 units, but this has occasionally led to shortages. Since demand during lead time follows a normal distribution with a mean of 500 units and a standard deviation of 120 units, the management now wants to set a new reorder point that ensures the probability of a stock-out does not exceed 5%. This requires determining the inventory level corresponding to the 95th percentile of demand using z-scores from the standard normal distribution. By computing this threshold, the company can make data-driven inventory decisions and enhance supply chain reliability.

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