**Business Analytics**

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

**Internal Assignment Applicable for June 2025 Examination**

**Q1. Given a dataset with missing values, apply appropriate data treatment techniques to handle the missing data. Justify your choice of method based on the nature of the dataset. Additionally, analyze a real-world scenario where missing data impacts decision-making, and implement suitable imputation methods to improve data quality**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Student\_ID** | **Name** | **Age** | **Gender** | **Math\_Score** | **English\_Score** | **Attendance (%)** |
| **101** | **Aarav** | **20** | **F** | **85** | **88** | **95** |
| **102** | **Bhavya** | **21** | **M** | **78** |  | **88** |
| **103** | **Charan** | **22** | **M** |  | **82** | **92** |
| **104** | **Deepak** |  | **M** | **92** | **91** |  |
| **105** | **Esha** | **20** | **F** | **88** | **85** | **97** |
| **106** | **Farhan** | **21** |  | **76** | **79** | **85** |
| **107** | **Gauri** |  | **F** | **80** | **86** | **90** |
| **108** | **Harshita** | **22** | **F** |  | **90** | **93** |
| **109** | **Ishan** | **23** | **M** | **90** |  | **89** |
| **110** | **Jyoti** | **20** | **F** | **84** | **87** |  |

**(10 Marks)**

**Answer:**

**Introduction:**

In real-world data collection, missing values are a common challenge that can impact the accuracy and reliability of analysis. Whether in academic performance records, healthcare data, or financial transactions, missing data can lead to biased conclusions and incorrect decision-making. Handling missing data properly is essential to ensure that datasets are complete, consistent, and useful for meaningful analysis.

**This is partially solved sample answer**

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**Q2 (A) A pharmaceutical company is testing a new drug for reducing blood pressure. They conduct a clinical trial with two groups: one receiving the drug and the other receiving a placebo. The blood pressure levels are recorded before and after the trial.**

**1. Analyse the components of a two-sample hypothesis test and determine why it is appropriate or not for this study. (1 Mark)**

**2. Given that the obtained p-value is 0.08, break down the decision-making process for rejecting or failing to reject the null hypothesis at a 5% significance level. (1 Mark)**

**3. Examine the potential risks associated with Type I and Type II errors in this study and discuss how they could affect the interpretation of results. (1 Mark)**

**4. The company wants to check whether the drug's effectiveness varies across different age groups (e.g., 30-40, 41-50, 51-60). Analyse whether the Chi-square test of independence is an appropriate test in this scenario. (1 Mark)**

**5. Differentiate between the Chi-square Goodness of Fit test and the Chi-square test of independence, and analyse how each applies to different types of pharmaceutical studies. (1 Mark)**

**(5 Marks)**

**Answer:**

**Introduction:**

A pharmaceutical company is conducting a clinical trial to test a new drug designed to reduce blood pressure. The trial consists of two groups: one receiving the drug and the other receiving a placebo. Blood pressure levels are recorded before and after the trial to determine whether the drug has a significant effect. To analyze the results, a two-sample hypothesis test is used to compare the means of the two groups. Additionally, statistical decision-making based on the p-value, potential risks of Type I and Type II errors, and the suitability of the Chi-square test for age-group analysis need to be evaluated. Understanding these concepts is essential for correctly interpreting the trial’s results.

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**Q2 (B) A company wants to predict sales based on advertising expenses using a simple linear regression model. The dataset for 5 months is given below:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Month** | **Advertising Expense (X in Rs 1000s)** | **Actual Sales (Y in Rs 1000s)** | **Predicted Sales (in Rs 1000s)** |
| **1** | **2** | **4** | **3.8** |
| **2** | **3** | **5** | **5.2** |
| **3** | **5** | **7** | **6.9** |
| **4** | **7** | **10** | **9.5** |
| **5** | **9** | **12** | **11.7** |

**1. Formulate the simple linear regression equation based on the given data.**

**2. Determine the regression coefficients (: Intercept, : Slope) and interpret their impact on sales.**

**3. Derive insights from the regression equation, understanding the baseline performance and the impact of advertising expenses on sales.**

**4. Suggest recommendations based on findings, highlighting the effectiveness of advertising expenses.**

**Instructions:**

**- Use Excel to compute the regression equation, coefficients, and R² value.**

**- Paste the Excel output with formulas to demonstrate calculations.**

**- Insights should be based on data from Excel analysis**

**(5 Marks)**

**Answer:**

**Introduction:**

Understanding the impact of advertising expenses on sales is crucial for businesses to optimize their marketing strategies. Simple linear regression helps establish a mathematical relationship between advertising costs and sales, allowing companies to predict future sales based on past spending patterns.

**This is partially solved sample answer**

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