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| C:\Users\ADMIN\Desktop\j.png | JAIPURIA INSTITUE OF MANAGEMENT, INDOREPost Graduate Diploma in Management |
|  Course Title: Statistics For Mangers, (10501)Improvement Examination, Term – I (November 2024) |
|  Time Duration: 2 Hours Total Marks: 40 |

*General Instructions*:

1. *Answer the questions as directed. The break-up of the marks is given wherever necessary.*
2. *Marks against each question is indicated to its right.*
3. *Answer all the questions of a 'Section/Question' at one place in continuation.*
4. *Answers should be brief and to the point.*
5. *Do not write on the question paper except your roll number.*

ProMark Analytics is a mid-sized marketing firm specializing in digital and offline campaigns. The company is known for using advanced analytics to drive customer engagement and increase sales conversions. It serves a diverse clientele segmented into age groups. It uses multiple marketing channels, such as online ads, social media campaigns, and offline events, to reach its audience. **Challenge is that** ProMark Analytics seeks to evaluate the **effectiveness of its marketing strategies**, specifically focusing on the performance of different marketing channels and customer spending patterns.

To do so, the firm conducted a customer survey to gather data on:

Age Group: 18–25, 26–35, 36–45, 46+

Monthly Spending: Customer spending on the firm's products or services.

Marketing Channel: The primary marketing mode that influences purchase decisions (online or offline).

Sales Conversion: Whether a customer made a purchase (Yes or No).

####  **Q1 Answer the following.** Using the dataset provided: **(10 Marks)**

1. Calculate the **mean**, **median**, **mode**, and **standard deviation** of **Monthly Spending**.
2. Create a frequency distribution table for **Monthly Spending** and create a **histogram**.
3. Analyze the spending patterns across different **Age Groups**.
4. Identify any outliers in **Monthly Spending** using the **IQR (Interquartile Range)** method.

#### **Q2.** The marketing firm claims that the average monthly Spending of customers aged 26-35 exceeds $200. **(10 Marks)**

1. Perform a **one-sample Z-test** with a significance level of 0.05.
2. Write down the null and alternative hypotheses for this test.
3. Interpret the test results (reject or fail to reject the null hypothesis).
4. Discuss whether the firm's claim is supported and explain the practical implications.

***Q3.*** *Determine if there is a significant relationship between the* ***Marketing Channel*** *and* ***Sales Conversion****.* ***(10 Marks)***

1. Construct a **contingency table** using the dataset.
2. Perform the **Chi-Square Test of Independence** at a 0.05 significance level.
3. Write down the null and alternative hypotheses for this test.
4. Interpret the p-value and discuss the results in the context of marketing strategy.

#### **Q4.**  Develop a regression model to predict **Monthly Spending** based on **Age Group** and **Sales Conversion (10 Marks)**

1. Perform an **ANOVA test** for the regression model and interpret the significance.
2. Identify and interpret the **coefficients** of the regression model.
3. Calculate the **R-squared** value and discuss the model's fit.
4. Suggest improvements to the model or additional variables that could enhance the prediction.

Appendix: data collected from customers

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| **Customer ID** | **Age Group** | **Monthly Spending ($)** | **Marketing Channel** | **Sales Conversion** |
| 1 | 18-25 | 150 | Online | Yes |
| 2 | 26-35 | 200 | Online | No |
| 3 | 18-25 | 250 | Offline | Yes |
| 4 | 36-45 | 300 | Online | Yes |
| 5 | 46+ | 400 | Offline | No |
| 6 | 26-35 | 180 | Online | Yes |
| 7 | 18-25 | 100 | Offline | No |
| 8 | 36-45 | 350 | Online | Yes |
| 9 | 46+ | 280 | Offline | No |
| 10 | 26-35 | 220 | Online | Yes |
| 11 | 18-25 | 170 | Online | Yes |
| 12 | 26-35 | 210 | Offline | No |
| 13 | 36-45 | 320 | Online | Yes |
| 14 | 46+ | 450 | Offline | No |
| 15 | 18-25 | 190 | Online | Yes |
| 16 | 26-35 | 240 | Online | Yes |
| 17 | 36-45 | 310 | Offline | Yes |
| 18 | 46+ | 390 | Online | No |
| 19 | 26-35 | 250 | Offline | Yes |
| 20 | 18-25 | 200 | Online | Yes |
| 21 | 36-45 | 300 | Offline | Yes |
| 22 | 46+ | 400 | Online | No |
| 23 | 26-35 | 230 | Offline | Yes |
| 24 | 18-25 | 210 | Online | No |
| 25 | 36-45 | 290 | Offline | Yes |
| 26 | 46+ | 360 | Online | Yes |
| 27 | 18-25 | 180 | Offline | Yes |
| 28 | 26-35 | 260 | Online | Yes |
| 29 | 36-45 | 310 | Offline | Yes |
| 30 | 46+ | 420 | Online | No |
| 31 | 18-25 | 150 | Online | Yes |
| 32 | 26-35 | 210 | Offline | No |
| 33 | 36-45 | 340 | Online | Yes |
| 34 | 46+ | 380 | Offline | No |
| 35 | 18-25 | 170 | Online | No |
| 36 | 26-35 | 190 | Online | Yes |
| 37 | 36-45 | 330 | Offline | Yes |
| 38 | 46+ | 400 | Online | No |
| 39 | 18-25 | 220 | Offline | Yes |
| 40 | 26-35 | 240 | Online | Yes |