# Assignment CHI-SQUARE TEST

**1. Goodness-of-Fit Test: Ice Cream Flavor Preference**

Are people's preferences for ice cream flavors equally distributed?

| Flavor | Observed Frequency |
|---|---|
| Chocolate | 90 |
| Vanilla | 60 |
| Strawberry | 40 |
| Mint | 30 |
| Mango | 20 |

- **Hypotheses**:
  - $\mathbf{H_o}$: Preferences are equally distributed across all flavors.
  - $\mathbf{H_1}$: Preferences are not equally distributed.

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**2. Test of Independence: Gender and Pet Ownership**

Is there an association between gender and pet ownership?

| Gender | Owns Pet | Does Not Own Pet |
|---|---|---|
| Male | 70 | 50 |
| Female | 60 | 80 |

- **Hypotheses**:
  - $\mathbf{H_o}$: Gender and pet ownership are independent.
  - $\mathbf{H_1}$: Gender and pet ownership are not independent.

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**3. Test of Independence: Age Group and Social Media Usage**

Does social media usage level vary by age group?

| Age Group | High Usage | Moderate Usage | Low Usage |
|---|---|---|---|
| 18-25 | 50 | 30 | 20 |
| 26-35 | 40 | 50 | 30 |
| 36-50 | 20 | 30 | 50 |

- **Hypotheses**:
  - $\mathbf{H_o}$: Social media usage and age group are independent.
  - $\mathbf{H_1}$: Social media usage and age group are not independent.

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# Assignment CHI-SQUARE TEST

**4. Goodness-of-Fit Test: Car Color Preference**

Are the preferences for car colors as expected based on market research?

| Car Color | Observed Frequency |
|---|---|
| White | 120 |
| Black | 90 |
| Silver | 70 |
| Blue | 50 |
| Red | 30 |

- **Hypotheses**:
  - $\mathbf{H_o}$: Observed car color preferences match the expected distribution.
  - $\mathbf{H_1}$: Observed car color preferences do not match the expected distribution.

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**5. Test of Homogeneity: Customer Satisfaction Across Service Providers**

Is customer satisfaction consistent across three internet service providers?

| Provider | Satisfied | Neutral | Dissatisfied |
|---|---|---|---|
| Provider A | 100 | 50 | 20 |
| Provider B | 80 | 60 | 30 |
| Provider C | 90 | 40 | 40 |

- **Hypotheses**:
  - $\mathbf{H_o}$: Satisfaction distribution is the same across all providers.
  - $\mathbf{H_1}$: Satisfaction distribution varies across providers.

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**6. Test of Independence: Education Level and Voting Preference**

Is there an association between education level and voting preference in a recent election?

| Education Level | Candidate A | Candidate B | Candidate C |
|---|---|---|---|
| High School | 30 | 20 | 15 |
| College | 40 | 35 | 20 |
| Postgraduate | 50 | 40 | 30 |

- **Hypotheses**:
  - $\mathbf{H_o}$: Education level and voting preference are independent.
  - $\mathbf{H_1}$: Education level and voting preference are not independent.

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# Assignment CHI-SQUARE TEST

**7. Test of Independence: Age Group and Gym Attendance Frequency**

Is gym attendance frequency associated with age group?

| Age Group | Daily | Weekly | Monthly | Rarely |
|---|---|---|---|---|
| 18-25 | 30 | 50 | 20 | 10 |
| 26-35 | 40 | 40 | 10 | 10 |
| 36-50 | 20 | 30 | 30 | 20 |

- **Hypotheses**:
  - **$H_o$**: Gym attendance frequency is independent of age group.
  - **$H_1$**: Gym attendance frequency is not independent of age group.

**8. Preference Among Smartphone Brands (Goodness-of-Fit Test)**

| Brand | Observed Frequency |
|---|---|
| Apple | 150 |
| Samsung | 120 |
| OnePlus | 80 |
| Xiaomi | 50 |
| Others | 30 |

  - **Null Hypothesis ($H_o$)**: The observed frequencies match the expected distribution.
  - **Alternative Hypothesis ($H_1$)**: The observed frequencies do not match the expected distribution.

Use this data to test if the observed frequencies align with expected equal distribution among the brands.

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**9. Association Between Gender and Movie Genre Preference (Test of Independence)**

| Gender | Action | Comedy | Drama | Sci-Fi | Horror |
|---|---|---|---|---|---|
| Male | 40 | 30 | 20 | 25 | 15 |
| Female | 25 | 35 | 30 | 20 | 20 |

  - Null Hypothesis ($H_o$): The two variables are independent.
  - Alternative Hypothesis ($H_1$): The two variables are not independent.

This data can be used to test whether movie genre preference is independent of gender.

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**10. Voting Patterns by Age Group (Test of Independence)**

| Age Group | Candidate A | Candidate B | Candidate C |
|---|---|---|---|
| 18-25 | 45 | 30 | 25 |

# Assignment CHI-SQUARE TEST

| Age Group | Candidate A | Candidate B | Candidate C |
|---|---|---|---|
| 26-35 | 50 | 35 | 15 |
| 36-50 | 60 | 40 | 30 |
| 51+ | 40 | 45 | 35 |

- Null Hypothesis ($H_o$): The distribution of satisfaction ratings is the same across brands.
- Alternative Hypothesis ($H_1$): The distribution of satisfaction ratings differs across brands.

Use this data to determine if voting preference is independent of age group.

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**11. Relationship Between Smoking Status and Disease Occurrence (Test of Independence)**

| Smoking Status | Disease Present | No Disease |
|---|---|---|
| Smoker | 80 | 120 |
| Non-Smoker | 50 | 150 |

- Null Hypothesis ($H_o$): Attendance levels are independent of season.
- Alternative Hypothesis ($H_1$): Attendance levels are associated with season.

Use this dataset to test if smoking status is associated with disease occurrence.

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**12. Dietary Habits by Income Level (Test of Independence)**

| Income Level | Vegetarian | Non-Vegetarian | Vegan |
|---|---|---|---|
| Low Income | 40 | 80 | 10 |
| Middle Income | 50 | 90 | 20 |
| High Income | 30 | 100 | 15 |

This dataset can be used to test if dietary preferences are independent of income level.

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**13. Preferred Shopping Method by Age Group (Test of Independence)**

| Age Group | Online Shopping | In-Store Shopping |
|---|---|---|
| 18-25 | 70 | 30 |
| 26-35 | 60 | 40 |
| 36-50 | 50 | 50 |
| 51+ | 30 | 70 |

Use this dataset to test if shopping method preference is associated with age group.

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**14. Social Media Usage and Hours of Sleep (Test of Independence)**

# Assignment CHI-SQUARE TEST

| Hours of Sleep | High Usage | Moderate Usage | Low Usage |
|---|---|---|---|
| Less than 5 | 40 | 20 | 10 |
| 5-7 | 50 | 60 | 20 |
| More than 7 | 30 | 70 | 50 |

Test if social media usage level is independent of hours of sleep.

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**15. Customer Satisfaction Ratings for Different Brands (Test of Homogeneity)**

| Brand | Satisfied | Neutral | Dissatisfied |
|---|---|---|---|
| Brand A | 80 | 30 | 10 |
| Brand B | 70 | 40 | 20 |
| Brand C | 90 | 20 | 15 |

Use this data to test if satisfaction ratings are homogeneous across different brands.

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**16. Pet Ownership and Housing Type (Test of Independence)**

| Housing Type | Owns Pet | Does Not Own Pet |
|---|---|---|
| Apartment | 50 | 100 |
| House | 80 | 60 |
| Condo | 30 | 40 |

Determine if pet ownership is related to housing type using this dataset.

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**17. Seasonal Trend in Gym Attendance (Testing for Trends)**

| Season | High Attendance | Moderate Attendance | Low Attendance |
|---|---|---|---|
| Winter | 40 | 50 | 10 |
| Spring | 60 | 40 | 20 |
| Summer | 30 | 60 | 30 |
| Fall | 50 | 40 | 20 |

This dataset can help you test if there's a significant trend in gym attendance across different seasons.