\documentclass{article}

\usepackage{amsmath}

\usepackage{booktabs}

\usepackage{array}

\usepackage{multirow}

\begin{document}

\section\*{Inferential Statistics Exercises for Psychology}

\subsection\*{Hypothesis Test for the Mean}

\begin{enumerate}

\item A psychologist wants to test if the average reaction time to a visual stimulus is different from 200 ms. A sample of 30 participants yielded a mean reaction time of 195 ms with a standard deviation of 25 ms. Perform a hypothesis test at the 0.05 significance level.

\item A study claims that the average sleep duration for college students is 7 hours. A random sample of 50 students has a mean sleep duration of 6.8 hours with a standard deviation of 1.2 hours. Test the claim at the 0.01 significance level.

\item A researcher hypothesizes that the average anxiety score (on a scale of 1-10) in a population is less than 5. A sample of 40 individuals has a mean anxiety score of 4.6 with a standard deviation of 1.1. Conduct a hypothesis test at the 0.05 level.

\item A psychologist believes that the average IQ score in a certain population is above 100. A sample of 25 individuals has a mean IQ score of 105 with a standard deviation of 15. Test the hypothesis at the 0.01 significance level.

\item A study investigates whether the average time spent on social media per day is more than 2 hours. A sample of 60 participants has a mean of 2.3 hours with a standard deviation of 0.8 hours. Perform a hypothesis test at the 0.05 level.

\item A psychologist wants to test if the average memory recall score (out of 100) is different from 75. A sample of 35 participants has a mean score of 72 with a standard deviation of 10. Conduct a hypothesis test at the 0.05 significance level.

\item A researcher claims that the average attention span in a population is 20 minutes. A sample of 45 individuals has a mean attention span of 18 minutes with a standard deviation of 4 minutes. Test the claim at the 0.01 significance level.

\item A study examines whether the average happiness score (on a scale of 1-10) is greater than 6. A sample of 50 participants has a mean score of 6.5 with a standard deviation of 1.2. Perform a hypothesis test at the 0.05 level.

\item A psychologist hypothesizes that the average stress level (on a scale of 1-10) in a population is less than 7. A sample of 40 individuals has a mean stress level of 6.8 with a standard deviation of 1.5. Conduct a hypothesis test at the 0.01 significance level.

\item A researcher wants to test if the average self-esteem score (out of 50) is different from 35. A sample of 30 participants has a mean score of 33 with a standard deviation of 8. Perform a hypothesis test at the 0.05 level.

\end{enumerate}

\subsection\*{Hypothesis Test for Proportion}

\begin{enumerate}

\item A psychologist claims that 60\% of individuals prefer therapy over medication for anxiety. In a sample of 100 individuals, 55 preferred therapy. Test the claim at the 0.05 significance level.

\item A study suggests that 30\% of college students experience test anxiety. In a sample of 200 students, 70 reported experiencing test anxiety. Test the claim at the 0.01 significance level.

\item A researcher hypothesizes that more than 50\% of individuals in a population prefer online counseling. In a sample of 150 individuals, 85 preferred online counseling. Conduct a hypothesis test at the 0.05 level.

\item A psychologist believes that less than 40\% of individuals in a population have a fear of public speaking. In a sample of 120 individuals, 40 reported having a fear of public speaking. Test the hypothesis at the 0.01 significance level.

\item A study claims that 25\% of individuals in a population have experienced burnout. In a sample of 300 individuals, 80 reported experiencing burnout. Test the claim at the 0.05 significance level.

\item A researcher wants to test if the proportion of individuals who prefer group therapy is different from 40\%. In a sample of 250 individuals, 110 preferred group therapy. Perform a hypothesis test at the 0.05 level.

\item A psychologist hypothesizes that more than 70\% of individuals in a population prefer mindfulness meditation. In a sample of 180 individuals, 135 preferred mindfulness meditation. Conduct a hypothesis test at the 0.01 significance level.

\item A study examines whether the proportion of individuals who experience seasonal affective disorder is less than 20\%. In a sample of 400 individuals, 70 reported experiencing seasonal affective disorder. Test the claim at the 0.05 significance level.

\item A researcher claims that 50\% of individuals in a population prefer cognitive-behavioral therapy. In a sample of 220 individuals, 115 preferred cognitive-behavioral therapy. Test the claim at the 0.01 significance level.

\item A psychologist wants to test if the proportion of individuals who prefer face-to-face counseling is different from 60\%. In a sample of 300 individuals, 170 preferred face-to-face counseling. Perform a hypothesis test at the 0.05 level.

\end{enumerate}

\subsection\*{Correlation}

\begin{enumerate}

\item A psychologist wants to examine the relationship between hours of sleep and stress levels. The following data was collected from 20 participants:

\begin{table}[h]

\centering

\begin{tabular}{cc}

\toprule

Hours of Sleep & Stress Level (1-10) \\

\midrule

6 & 8 \\

7 & 6 \\

5 & 9 \\

8 & 5 \\

6 & 7 \\

7 & 6 \\

5 & 8 \\

6 & 7 \\

7 & 6 \\

8 & 5 \\

6 & 7 \\

7 & 6 \\

5 & 8 \\

6 & 7 \\

7 & 6 \\

8 & 5 \\

6 & 7 \\

7 & 6 \\

5 & 8 \\

6 & 7 \\

\bottomrule

\end{tabular}

\end{table}

Calculate the Pearson correlation coefficient and test its significance at the 0.05 level.

\item A study investigates the relationship between self-esteem and academic performance. The following data was collected from 15 students:

\begin{table}[h]

\centering

\begin{tabular}{cc}

\toprule

Self-Esteem (1-10) & GPA \\

\midrule

8 & 3.5 \\

7 & 3.2 \\

6 & 3.0 \\

9 & 3.8 \\

5 & 2.8 \\

7 & 3.3 \\

8 & 3.6 \\

6 & 3.1 \\

7 & 3.4 \\

8 & 3.7 \\

5 & 2.9 \\

7 & 3.3 \\

8 & 3.6 \\

6 & 3.1 \\

7 & 3.4 \\

\bottomrule

\end{tabular}

\end{table}

Calculate the Pearson correlation coefficient and test its significance at the 0.01 level.

\item A researcher wants to examine the relationship between hours of exercise per week and life satisfaction. The following data was collected from 25 participants:

\begin{table}[h]

\centering

\begin{tabular}{cc}

\toprule

Hours of Exercise & Life Satisfaction (1-10) \\

\midrule

3 & 7 \\

4 & 8 \\

2 & 6 \\

5 & 9 \\

3 & 7 \\

4 & 8 \\

2 & 6 \\

5 & 9 \\

3 & 7 \\

4 & 8 \\

2 & 6 \\

5 & 9 \\

3 & 7 \\

4 & 8 \\

2 & 6 \\

5 & 9 \\

3 & 7 \\

4 & 8 \\

2 & 6 \\

5 & 9 \\

3 & 7 \\

4 & 8 \\

2 & 6 \\

5 & 9 \\

3 & 7 \\

\bottomrule

\end{tabular}

\end{table}

Calculate the Pearson correlation coefficient and test its significance at the 0.05 level.

\item A psychologist wants to examine the relationship between hours of screen time and anxiety levels. The following data was collected from 30 participants:

\begin{table}[h]

\centering

\begin{tabular}{cc}

\toprule

Hours of Screen Time & Anxiety Level (1-10) \\

\midrule

4 & 6 \\

5 & 7 \\

3 & 5 \\

6 & 8 \\

4 & 6 \\

5 & 7 \\

3 & 5 \\

6 & 8 \\

4 & 6 \\

5 & 7 \\

3 & 5 \\

6 & 8 \\

4 & 6 \\

5 & 7 \\

3 & 5 \\

6 & 8 \\

4 & 6 \\

5 & 7 \\

3 & 5 \\

6 & 8 \\

4 & 6 \\

5 & 7 \\

3 & 5 \\

6 & 8 \\

4 & 6 \\

5 & 7 \\

3 & 5 \\

6 & 8 \\

4 & 6 \\

5 & 7 \\

\bottomrule

\end{tabular}

\end{table}

Calculate the Pearson correlation coefficient and test its significance at the 0.01 level.

\item A study investigates the relationship between hours of study and exam performance. The following data was collected from 20 students:

\begin{table}[h]

\centering

\begin{tabular}{cc}

\toprule

Hours of Study & Exam Score (out of 100) \\

\midrule

10 & 75 \\

12 & 80 \\

8 & 70 \\

15 & 90 \\

10 & 75 \\

12 & 80 \\

8 & 70 \\

15 & 90 \\

10 & 75 \\

12 & 80 \\

8 & 70 \\

15 & 90 \\

10 & 75 \\

12 & 80 \\

8 & 70 \\

15 & 90 \\

10 & 75 \\

12 & 80 \\

8 & 70 \\

15 & 90 \\

\bottomrule

\end{tabular}

\end{table}

Calculate the Pearson correlation coefficient and test its significance at the 0.05 level.

\end{enumerate}

\subsection\*{Regression}

\begin{enumerate}

\item A psychologist wants to predict stress levels based on hours of sleep. The following data was collected from 20 participants:

\begin{table}[h]

\centering

\begin{tabular}{cc}

\toprule

Hours of Sleep & Stress Level (1-10) \\

\midrule

6 & 8 \\

7 & 6 \\

5 & 9 \\

8 & 5 \\

6 & 7 \\

7 & 6 \\

5 & 8 \\

6 & 7 \\

7 & 6 \\

8 & 5 \\

6 & 7 \\

7 & 6 \\

5 & 8 \\

6 & 7 \\

7 & 6 \\

8 & 5 \\

6 & 7 \\

7 & 6 \\

5 & 8 \\

6 & 7 \\

\bottomrule

\end{tabular}

\end{table}

Perform a linear regression analysis and interpret the results.

\item A study investigates the relationship between self-esteem and academic performance. The following data was collected from 15 students:

\begin{table}[h]

\centering

\begin{tabular}{cc}

\toprule

Self-Esteem (1-10) & GPA \\

\midrule

8 & 3.5 \\

7 & 3.2 \\

6 & 3.0 \\

9 & 3.8 \\

5 & 2.8 \\

7 & 3.3 \\

8 & 3.6 \\

6 & 3.1 \\

7 & 3.4 \\

8 & 3.7 \\

5 & 2.9 \\

7 & 3.3 \\

8 & 3.6 \\

6 & 3.1 \\

7 & 3.4 \\

\bottomrule

\end{tabular}

\end{table}

Perform a linear regression analysis and interpret the results.

\item A researcher wants to predict life satisfaction based on hours of exercise per week. The following data was collected from 25 participants:

\begin{table}[h]

\centering

\begin{tabular}{cc}

\toprule

Hours of Exercise & Life Satisfaction (1-10) \\

\midrule

3 & 7 \\

4 & 8 \\

2 & 6 \\

5 & 9 \\

3 & 7 \\

4 & 8 \\

2 & 6 \\

5 & 9 \\

3 & 7 \\

4 & 8 \\

2 & 6 \\

5 & 9 \\

3 & 7 \\

4 & 8 \\

2 & 6 \\

5 & 9 \\

3 & 7 \\

4 & 8 \\

2 & 6 \\

5 & 9 \\

3 & 7 \\

4 & 8 \\

2 & 6 \\

5 & 9 \\

3 & 7 \\

\bottomrule

\end{tabular}

\end{table}

Perform a linear regression analysis and interpret the results.

\item A psychologist wants to predict anxiety levels based on hours of screen time. The following data was collected from 30 participants:

\begin{table}[h]

\centering

\begin{tabular}{cc}

\toprule

Hours of Screen Time & Anxiety Level (1-10) \\

\midrule

4 & 6 \\

5 & 7 \\

3 & 5 \\

6 & 8 \\

4 & 6 \\

5 & 7 \\

3 & 5 \\

6 & 8 \\

4 & 6 \\

5 & 7 \\

3 & 5 \\

6 & 8 \\

4 & 6 \\

5 & 7 \\

3 & 5 \\

6 & 8 \\

4 & 6 \\

5 & 7 \\

3 & 5 \\

6 & 8 \\

4 & 6 \\

5 & 7 \\

3 & 5 \\

6 & 8 \\

4 & 6 \\

5 & 7 \\

3 & 5 \\

6 & 8 \\

4 & 6 \\

5 & 7 \\

\bottomrule

\end{tabular}

\end{table}

Perform a linear regression analysis and interpret the results.

\item A study investigates the relationship between hours of study and exam performance. The following data was collected from 20 students:

\begin{table}[h]

\centering

\begin{tabular}{cc}

\toprule

Hours of Study & Exam Score (out of 100) \\

\midrule

10 & 75 \\

12 & 80 \\

8 & 70 \\

15 & 90 \\

10 & 75 \\

12 & 80 \\

8 & 70 \\

15 & 90 \\

10 & 75 \\

12 & 80 \\

8 & 70 \\

15 & 90 \\

10 & 75 \\

12 & 80 \\

8 & 70 \\

15 & 90 \\

10 & 75 \\

12 & 80 \\

8 & 70 \\

15 & 90 \\

\bottomrule

\end{tabular}

\end{table}

Perform a linear regression analysis and interpret the results.

\end{enumerate}

\subsection\*{Independence Test}

\begin{enumerate}

\item A psychologist wants to test if there is an association between gender and preference for therapy type (individual vs. group). The following data was collected from 100 participants:

\begin{table}[h]

\centering

\begin{tabular}{lcc}

\toprule

& Individual Therapy & Group Therapy \\

\midrule

Male & 30 & 20 \\

Female & 25 & 25 \\

\bottomrule

\end{tabular}

\end{table}

Perform a chi-square test of independence at the 0.05 significance level.

\item A study investigates whether there is an association between age group (young, middle-aged, old) and preference for online vs. face-to-face counseling. The following data was collected from 150 participants:

\begin{table}[h]

\centering

\begin{tabular}{lccc}

\toprule

& Online Counseling & Face-to-Face Counseling \\

\midrule

Young & 30 & 20 \\

Middle-aged & 25 & 25 \\

Old & 20 & 30 \\

\bottomrule

\end{tabular}

\end{table}

Perform a chi-square test of independence at the 0.01 significance level.

\item A researcher wants to test if there is an association between education level (high school, college, graduate) and preference for medication vs. therapy. The following data was collected from 200 participants:

\begin{table}[h]

\centering

\begin{tabular}{lccc}

\toprule

& Medication & Therapy \\

\midrule

High School & 40 & 30 \\

College & 35 & 35 \\

Graduate & 25 & 35 \\

\bottomrule

\end{tabular}

\end{table}

Perform a chi-square test of independence at the 0.05 significance level.

\item A psychologist wants to test if there is an association between income level (low, middle, high) and preference for mindfulness meditation vs. exercise. The following data was collected from 180 participants:

\begin{table}[h]

\centering

\begin{tabular}{lccc}

\toprule

& Mindfulness Meditation & Exercise \\

\midrule

Low & 30 & 20 \\

Middle & 25 & 25 \\

High & 20 & 30 \\

\bottomrule

\end{tabular}

\end{table}

Perform a chi-square test of independence at the 0.01 significance level.

\item A study investigates whether there is an association between marital status (single, married, divorced) and preference for individual vs. group therapy. The following data was collected from 220 participants:

\begin{table}[h]

\centering

\begin{tabular}{lccc}

\toprule

& Individual Therapy & Group Therapy \\

\midrule

Single & 40 & 30 \\

Married & 35 & 35 \\

Divorced & 25 & 35 \\

\bottomrule

\end{tabular}

\end{table}

Perform a chi-square test of independence at the 0.05 significance level.

\end{enumerate}

\subsection\*{Analysis of Variance (ANOVA)}

\begin{enumerate}

\item A psychologist wants to test if there is a difference in stress levels among three groups (Group A, Group B, Group C). The following data was collected:

\begin{table}[h]

\centering

\begin{tabular}{ccc}

\toprule

Group A & Group B & Group C \\

\midrule

5 & 6 & 7 \\

6 & 7 & 8 \\

5 & 6 & 7 \\

6 & 7 & 8 \\

5 & 6 & 7 \\

6 & 7 & 8 \\

5 & 6 & 7 \\

6 & 7 & 8 \\

5 & 6 & 7 \\

6 & 7 & 8 \\

\bottomrule

\end{tabular}

\end{table}

Perform a one-way ANOVA at the 0.05 significance level.

\item A study investigates whether there is a difference in anxiety levels among four groups (Group 1, Group 2, Group 3, Group 4). The following data was collected:

\begin{table}[h]

\centering

\begin{tabular}{cccc}

\toprule

Group 1 & Group 2 & Group 3 & Group 4 \\

\midrule

4 & 5 & 6 & 7 \\

5 & 6 & 7 & 8 \\

4 & 5 & 6 & 7 \\

5 & 6 & 7 & 8 \\

4 & 5 & 6 & 7 \\

5 & 6 & 7 & 8 \\

4 & 5 & 6 & 7 \\

5 & 6 & 7 & 8 \\

4 & 5 & 6 & 7 \\

5 & 6 & 7 & 8 \\

\bottomrule

\end{tabular}

\end{table}

Perform a one-way ANOVA at the 0.01 significance level.

\item A researcher wants to test if there is a difference in self-esteem scores among three groups (Group X, Group Y, Group Z). The following data was collected:

\begin{table}[h]

\centering

\begin{tabular}{ccc}

\toprule

Group X & Group Y & Group Z \\

\midrule

7 & 8 & 9 \\

8 & 9 & 10 \\

7 & 8 & 9 \\

8 & 9 & 10 \\

7 & 8 & 9 \\

8 & 9 & 10 \\

7 & 8 & 9 \\

8 & 9 & 10 \\

7 & 8 & 9 \\

8 & 9 & 10 \\

\bottomrule

\end{tabular}

\end{table}

Perform a one-way ANOVA at the 0.05 significance level.

\item A psychologist wants to test if there is a difference in happiness levels among four groups (Group A, Group B, Group C, Group D). The following data was collected:

\begin{table}[h]

\centering

\begin{tabular}{cccc}

\toprule

Group A & Group B & Group C & Group D \\

\midrule

6 & 7 & 8 & 9 \\

7 & 8 & 9 & 10 \\

6 & 7 & 8 & 9 \\

7 & 8 & 9 & 10 \\

6 & 7 & 8 & 9 \\

7 & 8 & 9 & 10 \\

6 & 7 & 8 & 9 \\

7 & 8 & 9 & 10 \\

6 & 7 & 8 & 9 \\

7 & 8 & 9 & 10 \\

\bottomrule

\end{tabular}

\end{table}

Perform a one-way ANOVA at the 0.01 significance level.

\item A study investigates whether there is a difference in memory recall scores among three groups (Group 1, Group 2, Group 3). The following data was collected:

\begin{table}[h]

\centering

\begin{tabular}{ccc}

\toprule

Group 1 & Group 2 & Group 3 \\

\midrule

70 & 75 & 80 \\

75 & 80 & 85 \\

70 & 75 & 80 \\

75 & 80 & 85 \\

70 & 75 & 80 \\

75 & 80 & 85 \\

70 & 75 & 80 \\

75 & 80 & 85 \\

70 & 75 & 80 \\

75 & 80 & 85 \\

\bottomrule

\end{tabular}

\end{table}

Perform a one-way ANOVA at the 0.05 significance level.

\end{enumerate}

\end{document}