20. Scenario:

You are a data scientist working for an e-commerce company. The marketing team has conducted

an A/B test to evaluate the effectiveness of two different website designs (A and B) in terms of

conversion rate. They randomly divided the website visitors into two groups, with one group

experiencing design A and the other experiencing design B. After a week of data collection, you

now have the conversion rate data for both groups. You want to determine whether there is a

statistically significant difference in the mean conversion rates between the two website designs.

Question:

"Based on the data collected from the A/B test, is there a statistically significant difference in the

mean conversion rates between website design A and website design B?"

code:

#20

import pandas as pd

from scipy import stats

# Load data from Excel

df = pd.read\_excel(r"C:\Users\hares\Downloads\q20\_05.xlsx")

# Split into two groups

group\_a = df[df["Group"] == "A"]["Conversion\_Rate"]

group\_b = df[df["Group"] == "B"]["Conversion\_Rate"]

# Perform independent two-sample t-test

t\_stat, p\_value = stats.ttest\_ind(group\_a, group\_b, equal\_var=False)

# Display results

print("=== A/B Test Results ===")

print(f"Design A - Mean Conversion Rate: {group\_a.mean():.4f}")

print(f"Design B - Mean Conversion Rate: {group\_b.mean():.4f}")

print(f"T-statistic: {t\_stat:.4f}")

print(f"P-value: {p\_value:.4f}")

if p\_value < 0.05:

print("✅ Statistically significant difference in conversion rates.")

else:

print("❌ No statistically significant difference in conversion rates.")

output:

=== A/B Test Results ===

Design A - Mean Conversion Rate: 0.1020

Design B - Mean Conversion Rate: 0.1390

T-statistic: -5.9760

P-value: 0.0000

✅ Statistically significant difference in conversion rates.

Dataset :

|  |  |
| --- | --- |
| **Group** | **Conversion\_Rate** |
| A | 0.1 |
| A | 0.09 |
| A | 0.11 |
| A | 0.13 |
| A | 0.08 |
| A | 0.09 |
| A | 0.12 |
| A | 0.11 |
| A | 0.1 |
| A | 0.09 |
| B | 0.14 |
| B | 0.13 |
| B | 0.15 |
| B | 0.14 |
| B | 0.16 |
| B | 0.12 |
| B | 0.13 |
| B | 0.14 |
| B | 0.13 |
| B | 0.15 |