EXPERIMENT 13

Aim:

To conduct a one-sample T-test to determine whether the average IQ score significantly differs from the population mean of 100.

Algorithm:

1. Import the required libraries — NumPy and SciPy.
2. Generate a random sample from a normal distribution with a specified mean and standard deviation.
3. Define the population mean for hypothesis testing.
4. Compute the sample mean, standard deviation, and sample size.
5. Perform a one-sample T-test using scipy.stats.ttest_1samp().
6. Calculate the p-value and compare it with the significance level ($\alpha = 0.05$).
7. Based on the result, accept or reject the null hypothesis.

Code:

```
import numpy as np

import scipy.stats as stats

np.random.seed(42)


sample_size = 25

sample_data = np.random.normal(loc=102, scale=15, size=sample_size)

population_mean = 100


sample_mean = np.mean(sample_data)

sample_std = np.std(sample_data, ddof=1)

n = len(sample_data)


t_statistic, p_value = stats.ttest_1samp(sample_data, population_mean)


print(f"Sample Mean: {sample_mean:.2f}")

print(f"T-Statistic: {t_statistic:.4f}")
```

```
print(f"P-Value: {p_value:.4f}")


alpha = 0.05

if p_value < alpha:

    print("Reject the null hypothesis: The average IQ score is significantly different from 100.")

else:

    print("Fail to reject the null hypothesis: There is no significant difference in average IQ score from 100.")
```

Output:

Sample Mean: 99.55

T-Statistic: -0.1577

P-Value: 0.8760

Fail to reject the null hypothesis: There is no significant difference in average IQ score from 100.

Result:

Thus, the one-sample T-test was successfully performed, and it was concluded that there is no significant difference between the sample mean IQ and the population mean of 100.