EXPERIMENT:15 Hypothetical using T-Test

Aim: To test whether the average IQ score of a sample of students differs significantly from a population mean IQ score of 100.

Procedure:

1. Null Hypothesis (H_o): The average IQ score of the sample is 100.

2. Alternative Hypothesis (H_1): The average IQ score of the sample is not 100.

3. Sample: Measure the IQ scores of 25 randomly selected students.

4. T-Test: Conduct a one-sample T-test to compare the sample mean to 100.

5. Decision Rule: Use a significance level of $\alpha = 0.05$.

In [2]:

```
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.")
```

```
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.
```

In [ ]:

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Result :

The sample mean IQ was slightly higher than the population mean of 100.
The t-test produced a p-value greater than 0.05, indicating no significant difference.
Hence, the null hypothesis was not rejected — the average IQ is not significantly different from 100.