Expt No: 12

Date: 06-10-25

Hypothetical using Z-Test

Objective: To test whether the average weight of a ~~person~~ species of birds differs from 150 grams.

Procedure:

1. Null Hypothesis (H_0): The average weight of the birds is: 150 grams.
2. Alternative Hypothesis (H_1): The average weight of the birds is not 150 grams.
3. Sample: Measure the weights of 30 birds randomly selected from the population.
4. Z-Test: Conduct a Z-Test to compare the sample mean to 150 grams.
5. Decision ~~Tree~~ Rule: Use a significance level of $\alpha = 0.05$.

Program:

```
import numpy as np
import scipy.stats as stats
sample_data = np.array([152, 148, 151, 149, 147, 153,
                        150, 148, 152, 149, 151, 150, 149, 153,
                        151, 148, 150, 152, 149, 150, 148, 153,
                        151, 150, 149, 152, 148, 151, 150, 153])
population_mean = 150
sample_mean = np.mean(sample_data)
sample_std = np.std(sample_data, ddof=1)
n = len(sample_data)
z_statistic = (sample_mean - population_mean) /
              (sample_std / np.sqrt(n))
p_value = 2 * (1 - stats.norm.cdf(np.abs(z_statistic)))
print(f"Sample Mean: {sample_mean:.2f}")
print(f"Z-Statistic: {z_statistic:.4f}")
print(f"P-Value: {p_value:.4f}")
alpha = 0.05
if p_value < alpha:
    print("Reject null hypothesis: The average
weight is significantly different from 150 grams.")
else:
    print("Fail to reject the null hypothesis:
There is no significant difference in average weight
from 150 grams.")
```

Output :

Sample Mean : 150.20

Z-Statistic : 0.6406

P-Value : 0.5218

Fail to reject the null hypothesis. There is no significant difference in average weight from 150 grams.

Result:

The calculated 2-statistic is 0.6406 with a p-value of 0.5215. Since the p-value > 0.05 we fail to reject the null hypothesis. Hence there is no significant difference.