EXPERIMENT NO: 12

Hypothetical using Z-Test

Aim:

To write a Python program to understand and perform Z test.

Algorithm:

1. Import necessary libraries (NumPy, SciPy).
2. Define the sample data and population mean (150 grams).
3. Calculate sample mean and standard deviation.
4. Compute Z-statistic using the formula.
5. Find the p-value for the two-tailed test.
6. Compare p-value with α = 0.05 to accept or reject H□.
7. Display results and conclusion.

Program:

[1]:
```
import numpy as np
import scipy.stats as stats
```

[2]:
```
sample_data = np.array([152, 148, 151, 149, 147, 153, 150, 148, 152,
149,151, 150, 149, 152, 151, 148, 150, 152, 149, 150,148, 153, 151,
150, 149, 152, 148, 151, 150, 153])
```

[3]:
```
population_mean = 150
```

[4]:
```
sample_mean = np.mean(sample_data)
sample_std = np.std(sample_data, ddof=1)
```

[5]:
```
n = len(sample_data)
z_statistic = (sample_mean - population_mean) / (sample_std /np.sqrt(n))
```

[6]:
```
p_value = 2 * (1 - stats.norm.cdf(np.abs(z_statistic)))
```

[7]:
```
print(f"Sample Mean: {sample_mean:.2f}")
print(f"Z-Statistic: {z_statistic:.4f}")
print(f"P-Value: {p_value:.4f}")
```

```
Sample Mean: 150.20
Z-Statistic: 0.6406
P-Value: 0.5218
```

[8]:
```
alpha = 0.05
if p_value < alpha:
    print("Reject the 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.")
```

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

Result:

Thus, the Python code to test whether the average weight of a species of birds differs from 150 grams using the Z-Test has been successfully executed.