**INPUT: Hypothesis Testing**

1. **A Hypothesis test using t-test statistical tests**

# import the necessary libraries

from scipy import stats

import numpy as np

# Sample

sample\_A = np.array([1,2,4,4,5,5,6,7,8,8])

sample\_B = np.array([1,2,2,3,3,4,5,6,7,7])

# Perform independent sample t-test

t\_statistic, p\_value = stats.ttest\_ind(sample\_A, sample\_B)

# Set the significance level (alpha)

alpha = 0.05

# Compute the degrees of freedom (df) (n\_A-1)+(n\_b-1)

df = len(sample\_A)+len(sample\_B)-2

# Calculate the critical t-value

# ppf is used to find the critical t-value for a two-tailed test

critical\_t = stats.t.ppf(1 - alpha/2, df)

# Print the results

print("T-value:", t\_statistic)

print("P-Value:", p\_value)

print("Critical t-value:", critical\_t)

# Decision

print('With T-value')

if np.abs(t\_statistic) >critical\_t:

print('There is significant difference between two groups')

else:

print('No significant difference found between two groups')

print('With P-value')

if p\_value >alpha:

print('No evidence to reject the null hypothesis that a significant difference between the two groups')

else:

print('Evidence found to reject the null hypothesis that a significant difference between the two groups')

1. **A Hypothesis test using TWO-test independent tests**

# Python program to implement Independent T-Test on the two independent samples

# Importing the required libraries

from scipy.stats import ttest\_ind

import numpy as np

# Creating the data groups

data\_group1 = np.array([12, 18, 12, 13, 15, 1, 7,

20, 21, 25, 19, 31, 21, 17,

17, 15, 19, 15, 12, 15])

data\_group2 = np.array([23, 22, 24, 25, 21, 26, 21,

21, 25, 30, 24, 21, 23, 19,

14, 18, 14, 12, 19, 15])

# Calculating the mean of the two data groups

mean1 = np.mean(data\_group1)

mean2 = np.mean(data\_group2)

# Print mean values

print("Data group 1 mean value:", mean1)

print("Data group 2 mean value:", mean2)

# Calculating standard deviation

std1 = np.std(data\_group1)

std2 = np.std(data\_group2)

# Printing standard deviation values

print("Data group 1 std value:", std1)

print("Data group 2 std value:", std2)

# Implementing the t-test

t\_test,p\_val = ttest\_ind(data\_group1, data\_group2)

print("The P-value is: ", p\_val)

# taking the threshold value as 0.05 or 5%

if p\_val < 0.05:

print("We can reject the null hypothesis")

else:

print("We can accept the null hypothesis")

**CONCLUSION:**