Experiment 3

Aim: 1. To implement two sample z-test. 2. To implement statistical Hypothesis Corelation test. 3. To implement two sample non-parametric hypothesis test

LO3: Design and implement various Statistical tests using python.

In [24]:
```
import pandas as pd
from statsmodels.stats import weightstats as stests
bp_before = [140, 154, 156, 167, 146, 160, 147, 156, 158, 160]
bp_after = [156, 120, 130, 171, 145, 150, 128, 125, 159, 131]
ztest ,propability_value = stests.ztest(bp_before, bp_after, value=146)
print(propability_value)
if propability_value<0.05:
    print("Null hyphothesis rejected , Alternative hyphothesis accepted")
else:
    print("Null hyphothesis accepted , Alternative hyphothesis rejected")
```

```
2.861284397728569e-110
Null hyphothesis rejected , Alternative hyphothesis accepted
```

The Z test involves determining the P-value and then verifying how close the determined P-value is to the significant value. Usually, the significance value is around 0.05. The P value stands for the representation of the probability value identified. The probability value mentions how possible the determined assumption is a null hypothesis or an alternative hypothesis. So based on the P value determined, the reality of the hypothesis assumption is validated. This is the critical process of the Z test.

In [25]:
```
# Spearman's Rank Correlation Test
from scipy.stats import spearmanr
data1 = [0.853, 2.817, 0.121, 0.945, -0.055, 1.436, -0.360, -1.478, -1.637, -1.8
data2 = [0.373, 3.517, 0.125, 7.545, -0.555, 1.536, -3.350, -1.578, -3.537, -1.5
stat, p = spearmanr(data1, data2)
print('stat=%.3f, p=%.3f' % (stat, p))
if p > 0.05:
        print('Probably independent')
else:
        print('Probably dependent')
```

```
stat=0.903, p=0.000
Probably dependent
```

Spearman's Rank Correlation Tests whether two samples have a monotonic relationship.

Assumptions

Observations in each sample are independent and identically distributed (iid).
Observations in each sample can be ranked. Interpretation

H0: the two samples are independent. H1: there is a dependency between the samples.

In [26]:
```
# Mann-Whitney U Test
from scipy.stats import mannwhitneyu
row1 = [540, 670, 1000, 960, 1200, 4650, 4200]
row2 = [5000, 4200, 1300, 900, 7400, 4500, 7500]
```

```
stat, p = mannwhitneyu(row1, row2)
print('stat=%.3f, p=%.3f' % (stat, p))
if p > 0.05:
        print('Probably the same distribution')
else:
        print('Probably different distributions')
```

```
stat=9.500, p=0.064
Probably the same distribution
```

Nonparametric Statistical Hypothesis Tests Mann-Whitney U Test Tests whether the distributions of two independent samples are equal or not.

Assumptions

Observations in each sample are independent and identically distributed (iid). Observations in each sample can be ranked. Interpretation

H0: the distributions of both samples are equal. H1: the distributions of both samples are not equal.

Conclusion: In this experiment we learnt how to use import dataset and conduct Z-test, Hypothesis test, parameterised and non parametrized Hypothesis Test

POs achieved: PO1,PO2,PO3,PO4,PO5,PO8,PO10,PO12.