Lab6_Part_2-Hypothesis Testion

Choose the best Test and apply.

Question1:

suppose we want to know whether or not the mean weight of a certain species of some turtle is equal to 310 pounds.

To test this, we go out and collect a simple random sample of turtles with the following weights:

Weights: 300, 315, 320, 311, 314, 309, 300, 308, 305, 303, 305, 301, 303

In [6]:
```
import numpy as np
from scipy.stats import ttest_1samp

# Creating a sample of weights
weights = [300, 315, 320, 311, 314, 309, 300, 308, 305, 303, 305, 301, 303]

# Calculating the mean of the sample
mean = np.mean(weights)
print(mean)

# Performing the T-Test
t_test, p_val = ttest_1samp(weights, 310)
print("P-value is: ", p_val)

# Take the threshold value as 0.05
if p_val < 0.05:
    print(" We can reject the null hypothesis")
else:
    print("We fail to reject the null hypothesis")
```

```
307.2307692307692
P-value is:  0.1389944275158753
We fail to reject the null hypothesis
```

Question2:

suppose we want to know whether or not the mean weight between two different species of turtles is equal.

To test this, we collect a simple random sample of turtles from each species with the following weights:

Sample 1: 300, 315, 320, 311, 314, 309, 300, 308, 305, 303, 305, 301, 303

Sample 2: 335, 329, 322, 321, 324, 319, 304, 308, 305, 311, 307, 300, 305

In [5]:
```
from scipy.stats import ttest_ind
sample1 = np.array([300, 315, 320, 311, 314, 309, 300, 308, 305, 303, 305, 301
sample2 = np.array([335, 329, 322, 321, 324, 319, 304, 308, 305, 311, 307, 300

mean1 = np.mean(sample1)
mean2 = np.mean(sample2)

print("Species group 1 mean value:", mean1)
print("Species group 2 mean value:", mean2)

std1 = np.std(sample1)
std2 = np.std(sample2)

print("\nData group 1 std value:", std1)
print("Data group 2 std value:", std2)

t_test,p_val = ttest_ind(sample1, sample2)
print("\nThe P-value is: ", p_val)

if p_val < 0.05:
    print("We can reject the null hypothesis")
else:
    print("We can accept the null hypothesis")
```

```
Species group 1 mean value: 307.2307692307692
Species group 2 mean value: 314.61538461538464

Data group 1 std value: 6.053020176278769
Data group 2 std value: 10.565098285162705

The P-value is:  0.04633501389516513
We can reject the null hypothesis
```

Question3:

suppose we want to know whether or not a certain training program is able to increase the max vertical jump (in inches) of basketball players.

The following data shows the max jump height (in inches) before and after using the training program for each player:

Before: 22, 24, 20, 19, 19, 20, 22, 25, 24, 23, 22, 21

After: 23, 25, 20, 24, 18, 22, 23, 28, 24, 25, 24, 20

In [7]:
```
from scipy.stats import ttest_rel

before = [22, 24, 20, 19, 19, 20, 22, 25, 24, 23, 22, 21]
after = [23, 25, 20, 24, 18, 22, 23, 28, 24, 25, 24, 20]

t_test, p_val = ttest_rel(before, after)

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")
```

```
The P-value is:  0.02802807458682508
We can reject the null hypothesis
```