2) A hospital wants to determine whether there is any difference in the average Turn Around Time (TAT) of reports of the laboratories on their preferred list. they collected a random sample and recorded TAT for reports of 4 laboratories. TAT is defined as sample collected to report dispatch. analyze the data and determine whether there is any difference in average TAT among the different laboratories at 5% significance level

1 - Business Problem

Is there a significant difference in the average Turn Around Time between laboratories ?

2 - Data description

α == 0.05 (95% Confidence)

Y == Continious

X == Discrete

Is Y1, Y2, Y3 and Y4 normal ?

H0 = Y1, Y2, Y3 and Y4 are normal

H1 = Y1, Y2, Y3 and Y4 are not normal

3 - Normality Test

In [2]:

```
import pandas as pd
import numpy as np
from scipy import stats
data = pd.read_csv('LabTAT.csv')
data
```

Out[2]:

	Laboratory 1	Laboratory 2	Laboratory 3	Laboratory 4
0	185.35	165.53	176.70	166.13
1	170.49	185.91	198.45	160.79
2	192.77	194.92	201.23	185.18
3	177.33	183.00	199.61	176.42
4	193.41	169.57	204.63	152.60
...	...	...	...	...
115	178.49	170.66	193.80	172.68
116	176.08	183.98	215.25	177.64
117	202.48	174.54	203.99	170.27
118	182.40	197.18	194.52	150.87
119	182.09	215.17	221.49	162.21

120 rows × 4 columns

In [3]:

```
data1=data.rename(columns={'Laboratory 1':'L1','Laboratory 2':'L2','Laboratory 3':'L3','Lab
data1.head(2)
```

Out[3]:

	L1	L2	L3	L4
0	185.35	165.53	176.70	166.13
1	170.49	185.91	198.45	160.79

In [5]:

```
stats.shapiro(data1["L1"])
```

Out[5]:

```
ShapiroResult(statistic=0.9901824593544006, pvalue=0.5506953597068787)
```

(0.9901824593544006, 0.5506953597068787)

P value for Laboratory 1 == 0.55 > α

In [6]:

```
stats.shapiro(data1["L2"])
```

Out[6]:

```
ShapiroResult(statistic=0.9936322569847107, pvalue=0.8637524843215942)
```

(0.9936322569847107, 0.8637524843215942)

P value for Laboratory 2 == 0.86 > α

In [7]:

```
stats.shapiro(data1["L3"])
```

Out[7]:

```
ShapiroResult(statistic=0.9886345267295837, pvalue=0.4205053448677063)
```

(0.9886345267295837, 0.4205053448677063)

P value for Laboratory 3 == 0.42 > α

In [8]:

```
stats.shapiro(data1["L4"])
```

Out[8]:

```
ShapiroResult(statistic=0.9913753271102905, pvalue=0.6618951559066772)
```

(0.9913753271102905, 0.6618951559066772)

P value for Y1 (Unit B) == 0.66 > α

HO is accepted. Thats is Y1, Y2, Y3, and Y4 are normal.

4 - Variance

H0 == Variance of all 4 laboratories are the same

H1 == Variance of all 4 laboratories are the not same

In [12]:

```
stats.levene(data1["L1"], data1["L2"], data1["L3"], data1["L4"])
```

Out[12]:

```
LeveneResult(statistic=2.599642500418024, pvalue=0.05161343808309816)
```

LeveneResult(statistic=2.599642500418024, pvalue=0.05161343808309816)

P Value of Variance test is == 0.051 > α

H0 is accepted

Therefore, one way Anova Test will be performed.

5 - Model

H0 == Mean TAT for four laboratories equal (There is no significance difference between TAT of the laboratories)

H1 == Mean TAT for four laboratories not equal (There is a significance difference between TAT of the laboratories)

In [13]:

```
stats.stats.f_oneway(data1["L1"], data1["L2"], data1["L3"], data1["L4"])
```

Out[13]:

```
F_onewayResult(statistic=118.70421654401437, pvalue=2.1156708949992414e-57)
```

F_onewayResult(statistic=118.70421654401437, pvalue=2.1156708949992414e-57)

P value of the One way Anova test is == 2e-16 < α

H1 is accepted.

Mean TAT for 4 laboratories not equal (There is a significance difference between TAT of the laboratories)