In [2]:
```
import scipy.stats as stats
import statsmodels.api as sm
import numpy as np
import pandas as pd
import warnings
warnings.filterwarnings("ignore")
from PIL import ImageGrab
import matplotlib.pyplot as plt
import seaborn as sns
```

In [3]:
```
data = pd.read_csv('LabTAT.csv')
data.head()
```

Out[3]:

	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

In [4]:
```
data.describe()
```

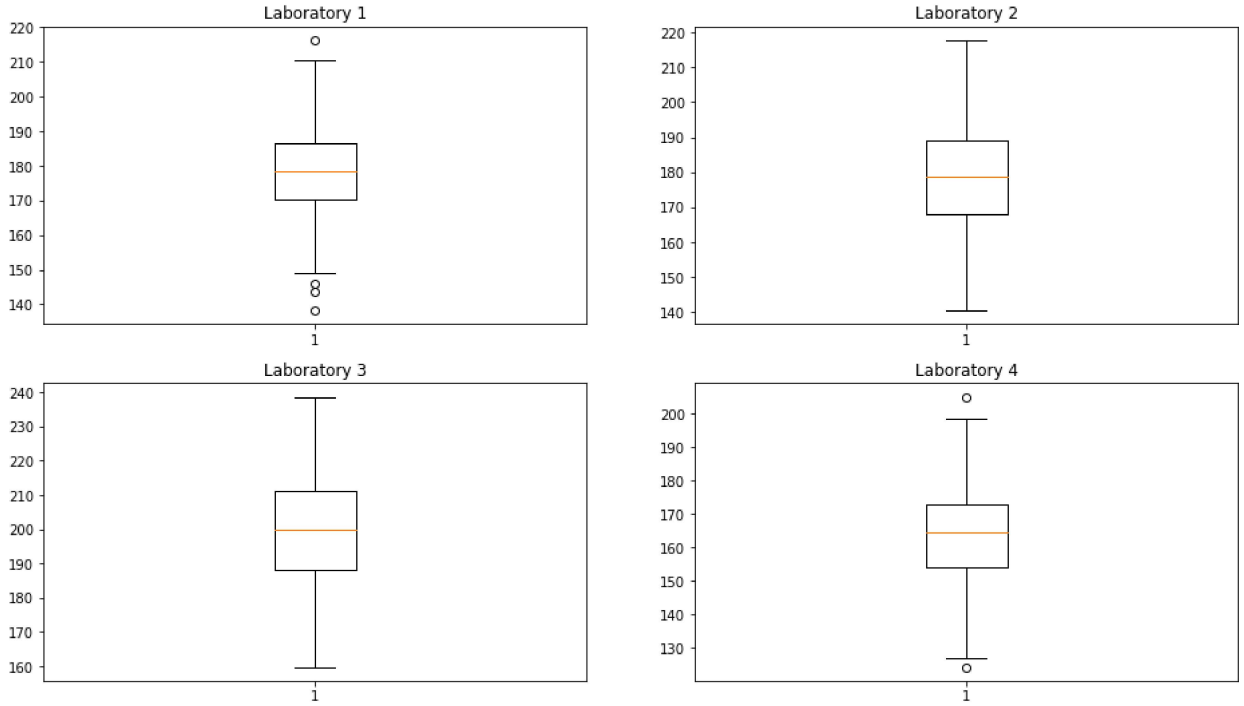
Out[4]:

	Laboratory 1	Laboratory 2	Laboratory 3	Laboratory 4
count	120.000000	120.000000	120.000000	120.00000
mean	178.361583	178.902917	199.913250	163.68275
std	13.173594	14.957114	16.539033	15.08508
min	138.300000	140.550000	159.690000	124.06000
25%	170.335000	168.025000	188.232500	154.05000
50%	178.530000	178.870000	199.805000	164.42500
75%	186.535000	189.112500	211.332500	172.88250
max	216.390000	217.860000	238.700000	205.18000

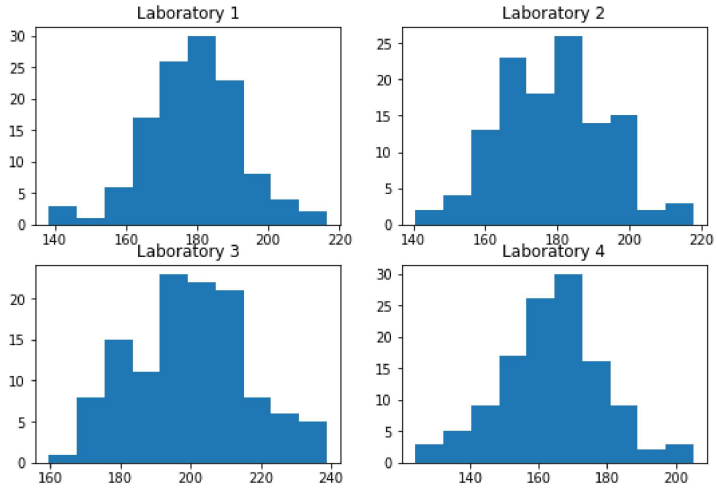
In [5]:
```
data.isnull().sum()
```

Out[5]:
```
Laboratory 1    0
Laboratory 2    0
Laboratory 3    0
Laboratory 4    0
dtype: int64
```

In [6]:
```
plt.subplots(figsize = (16,9))
plt.subplot(221)
plt.boxplot(data['Laboratory 1'])
plt.title('Laboratory 1')
plt.subplot(222)
plt.boxplot(data['Laboratory 2'])
plt.title('Laboratory 2')
plt.subplot(223)
plt.boxplot(data['Laboratory 3'])
plt.title('Laboratory 3')
plt.subplot(224)
plt.boxplot(data['Laboratory 4'])
plt.title('Laboratory 4')
plt.show()
```

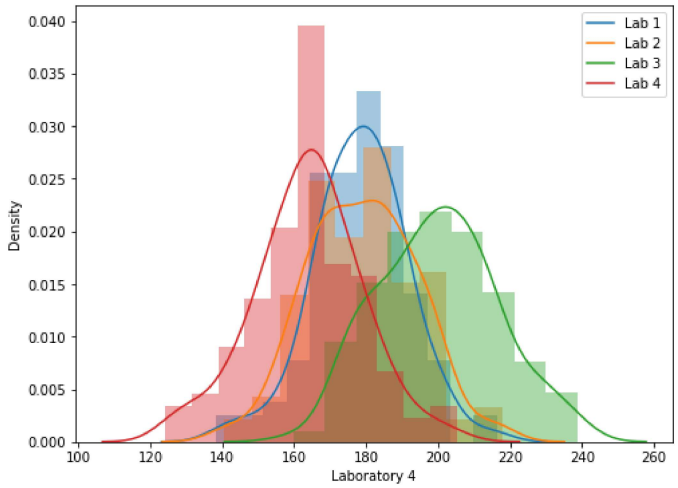


In [7]:
```
plt.subplots(figsize = (9,6))
plt.subplot(221)
plt.hist(data['Laboratory 1'])
plt.title('Laboratory 1')
plt.subplot(222)
plt.hist(data['Laboratory 2'])
plt.title('Laboratory 2')
plt.subplot(223)
plt.hist(data['Laboratory 3'])
plt.title('Laboratory 3')
plt.subplot(224)
plt.hist(data['Laboratory 4'])
plt.title('Laboratory 4')
plt.show()
```

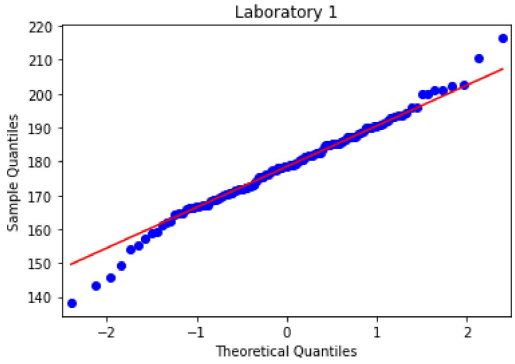


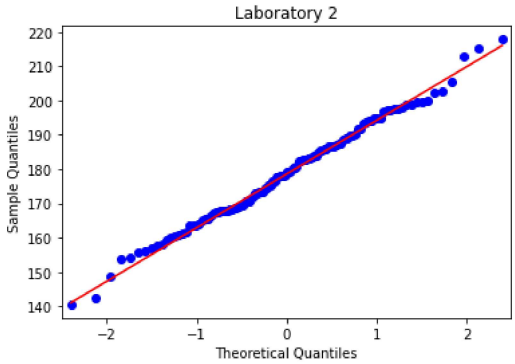
In [8]:
```
plt.figure(figsize = (8,6))
labels = ['Lab 1', 'Lab 2','Lab 3', 'Lab 4']
sns.distplot(data['Laboratory 1'], kde = True)
sns.distplot(data['Laboratory 2'],hist = True)
sns.distplot(data['Laboratory 3'],hist = True)
sns.distplot(data['Laboratory 4'],hist = True)
plt.legend(labels)
```

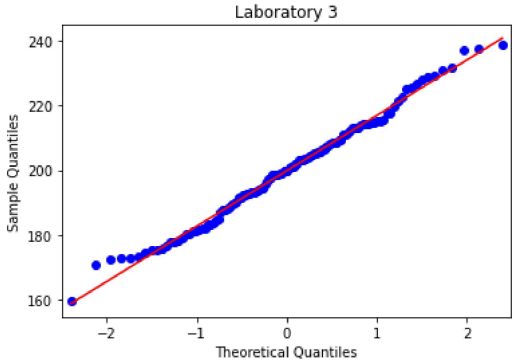
Out[8]: <matplotlib.legend.Legend at 0x26e49daf850>

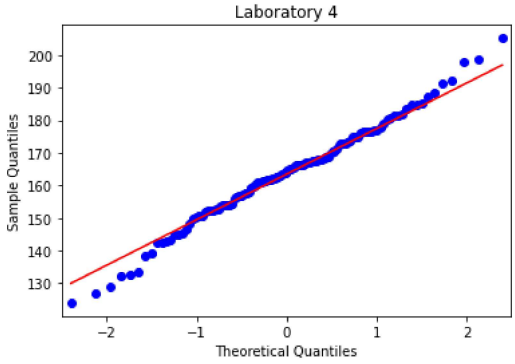


In [9]:
```
sm.qqplot(data['Laboratory 1'], line = 'q')
plt.title('Laboratory 1')
sm.qqplot(data['Laboratory 2'], line = 'q')
plt.title('Laboratory 2')
sm.qqplot(data['Laboratory 3'], line = 'q')
plt.title('Laboratory 3')
sm.qqplot(data['Laboratory 4'], line = 'q')
plt.title('Laboratory 4')
plt.show()
```









In [10]:
```
test_statistic , p_value = stats.f_oneway(data.iloc[:,0],data.iloc[:,1],data.iloc[:,2],data.iloc[:,3])
print('p_value =',p_value)
```

```
p_value = 2.1156708949992414e-57
```

In [11]:
```
alpha = 0.05
print('Significnace=%.3f, p=%.3f' % (alpha, p_value))
if p_value <= alpha:
    print('We reject Null Hypothesis there is a significance difference between TAT of reports of the laboratories')
else:
    print('We fail to reject Null hypothesis')
```

```
Significnace=0.050, p=0.000
We reject Null Hypothesis there is a significance difference between TAT of reports of the laboratories
```

In [ ]:
```

```