In [1]:
```
#Load Libraries
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
```

In [2]:
```
#Load Dataset
data=pd.read_csv('./FishWeight.csv')
data.head()
```

Out[2]:

	Length1	Length2	Length3	Height	Width	Weight
0	23.2	25.4	30.0	11.5200	4.0200	242.0
1	24.0	26.3	31.2	12.4800	4.3056	290.0
2	23.9	26.5	31.1	12.3778	4.6961	340.0
3	26.3	29.0	33.5	12.7300	4.4555	363.0
4	26.5	29.0	34.0	12.4440	5.1340	430.0

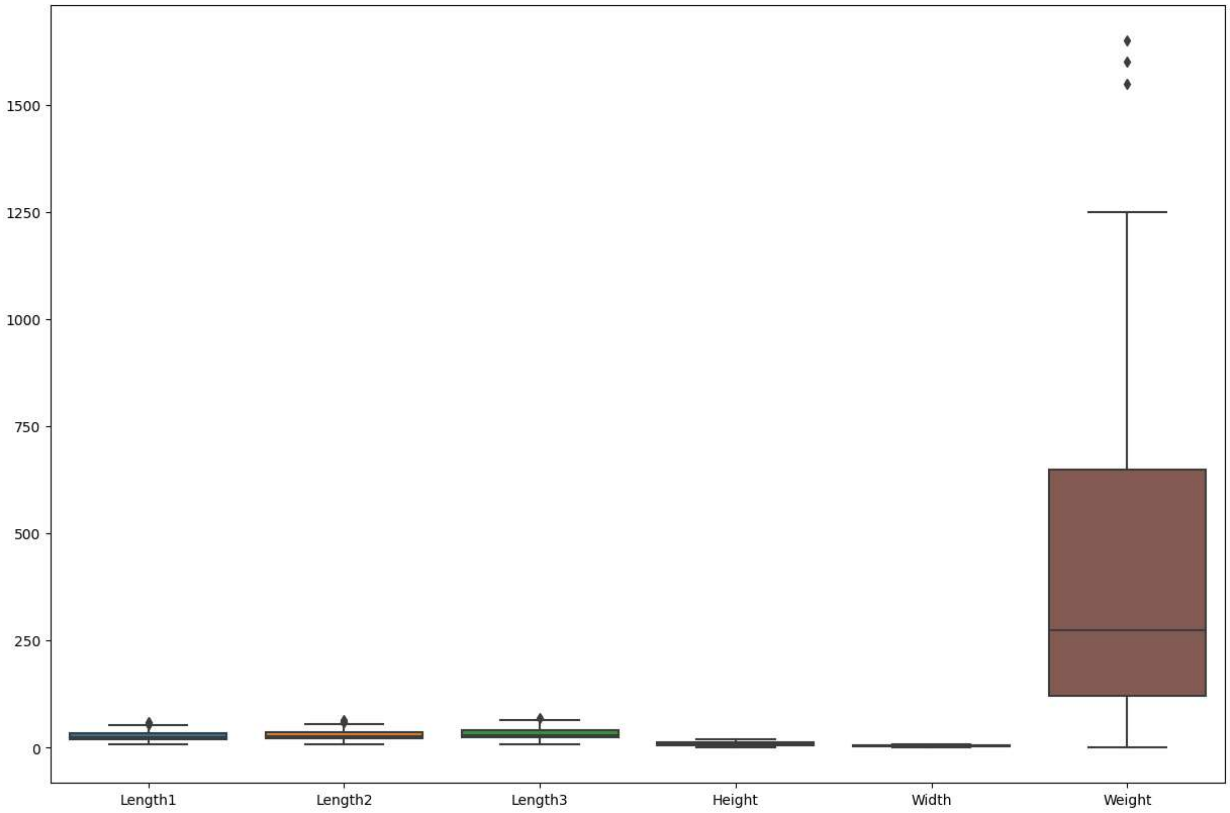
In [4]:
```
#Show Key Statistics
data.describe()
```

Out[4]:

	Length1	Length2	Length3	Height	Width	Weight
count	159.000000	159.000000	159.000000	159.000000	159.000000	159.000000
mean	26.247170	28.415723	31.227044	8.970994	4.417486	398.326415
std	9.996441	10.716328	11.610246	4.286208	1.685804	357.978317
min	7.500000	8.400000	8.800000	1.728400	1.047600	0.000000
25%	19.050000	21.000000	23.150000	5.944800	3.385650	120.000000
50%	25.200000	27.300000	29.400000	7.786000	4.248500	273.000000
75%	32.700000	35.500000	39.650000	12.365900	5.584500	650.000000
max	59.000000	63.400000	68.000000	18.957000	8.142000	1650.000000

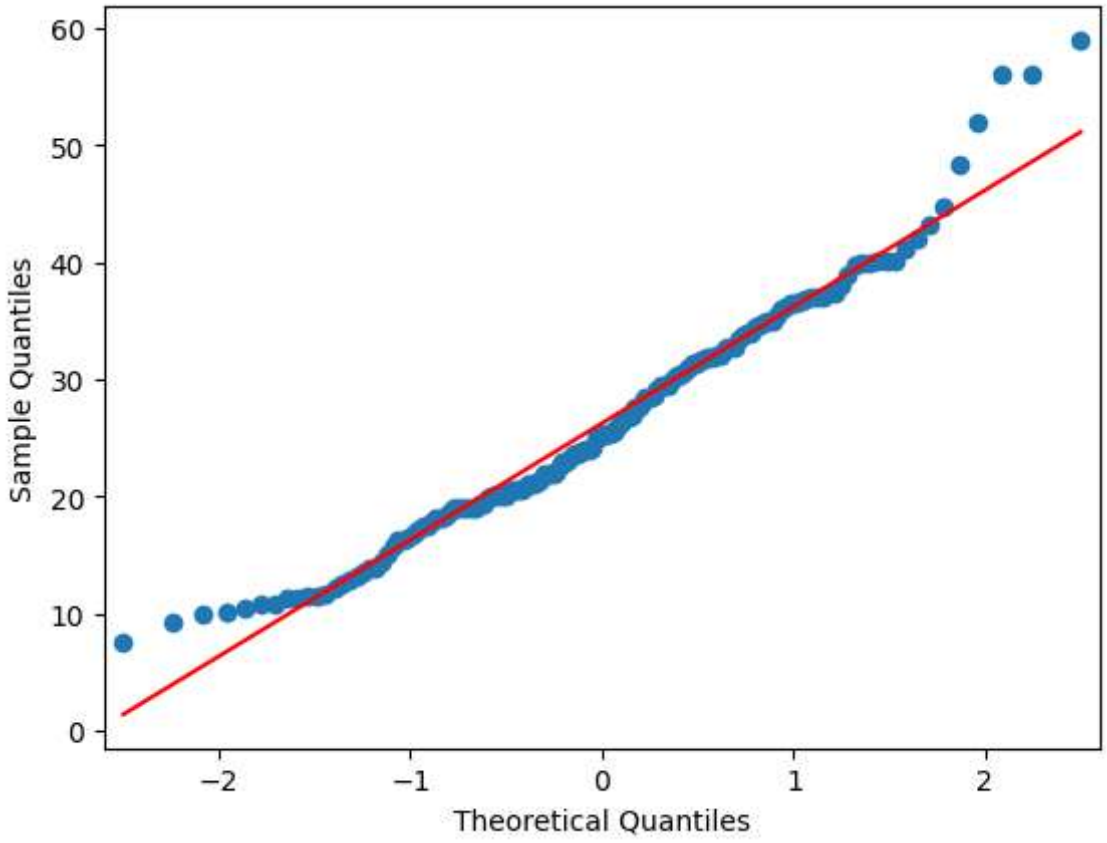
In [5]:
```
#Boxplot Visualization
plt.figure(figsize=(15,10))
sns.boxplot(data=data)
```

Out[5]:
```
<AxesSubplot: >
```

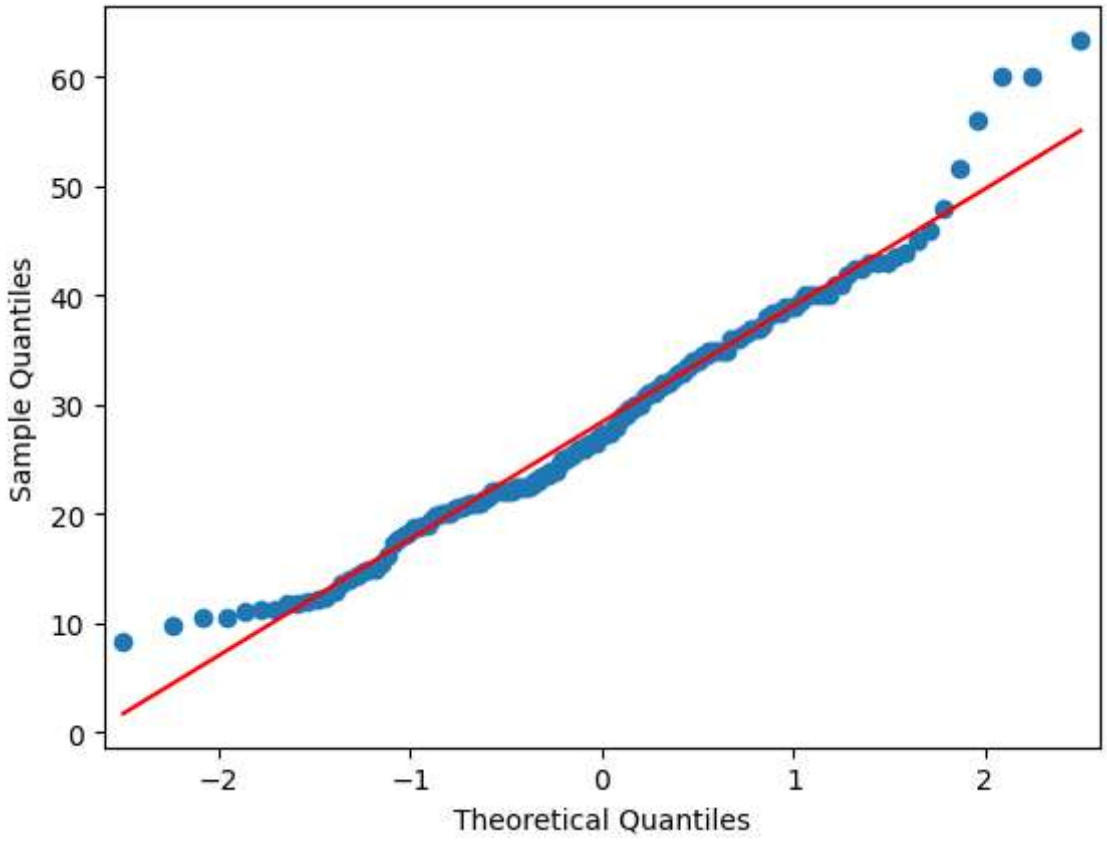


In [7]:
```
#Create QQ Plots

from statsmodels.graphics.gofplots import qqplot
import pylab

cnt = 1
for col in data.columns:
    print(col)
    qqplot(data[col],line='s')
    pylab.show()
    cnt += 1
```

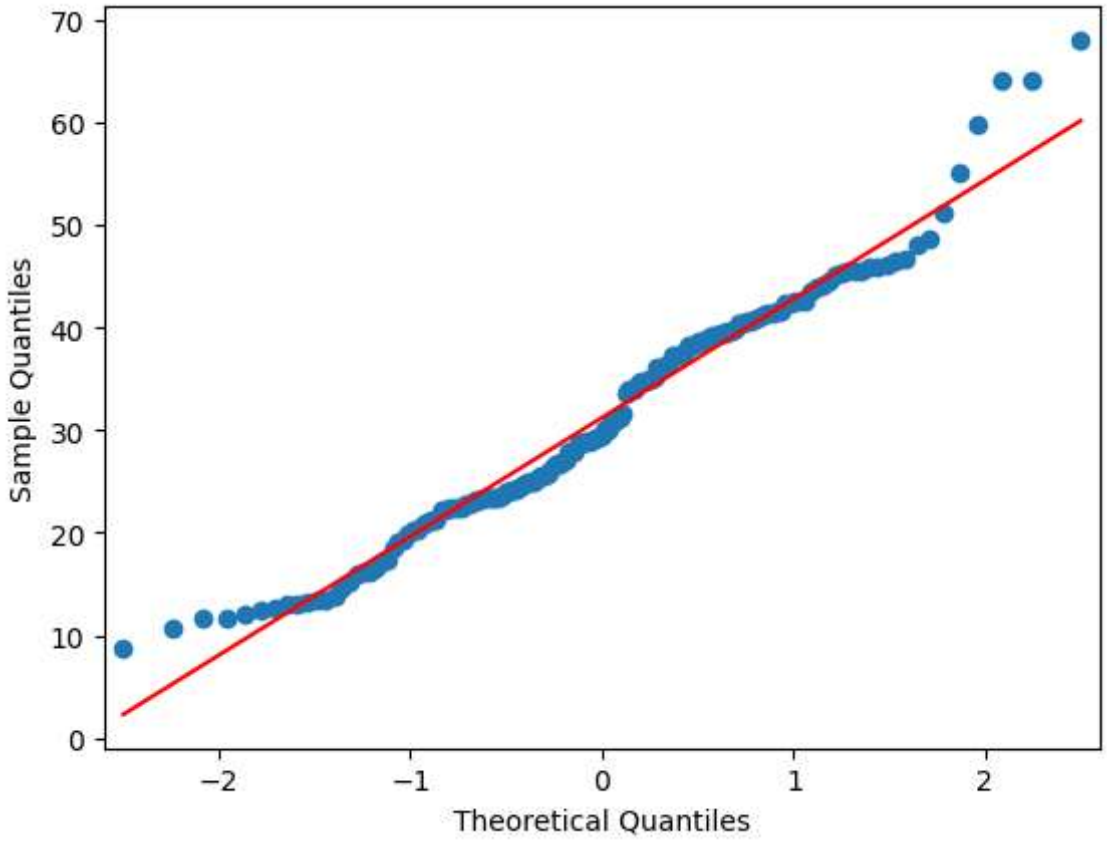
```
Length1
```



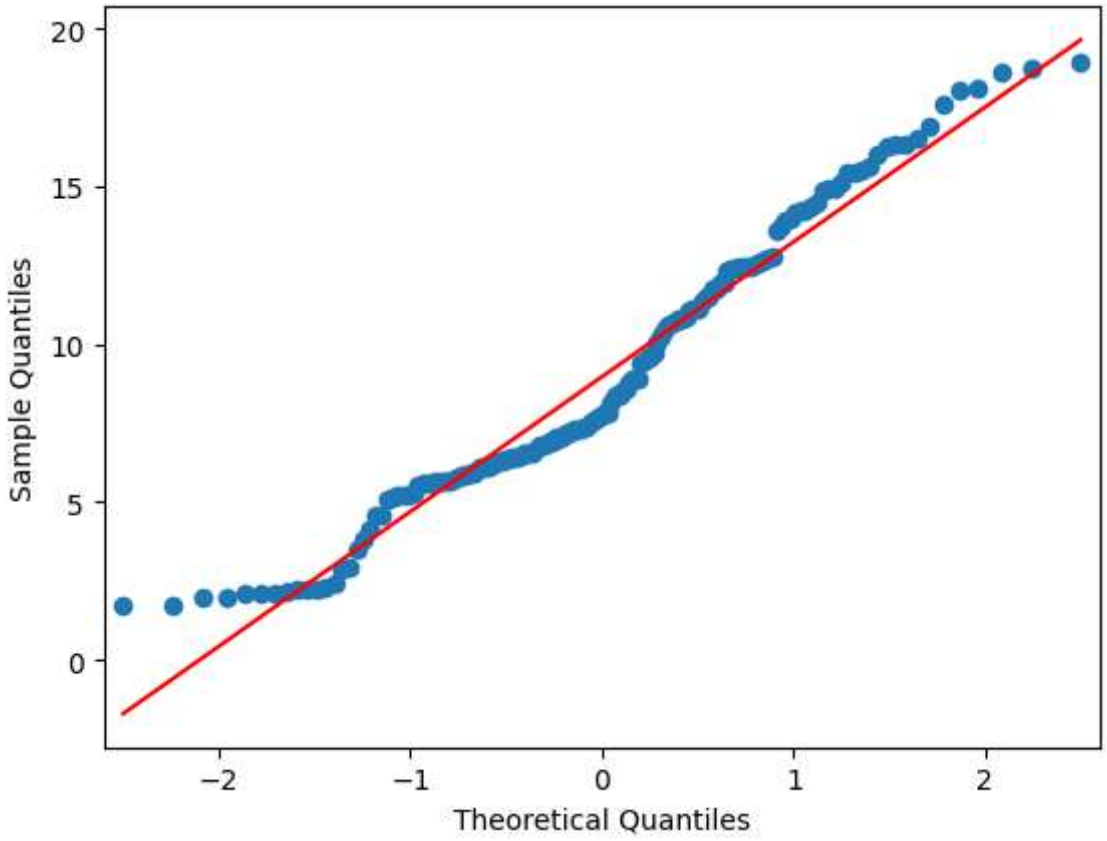
Length2



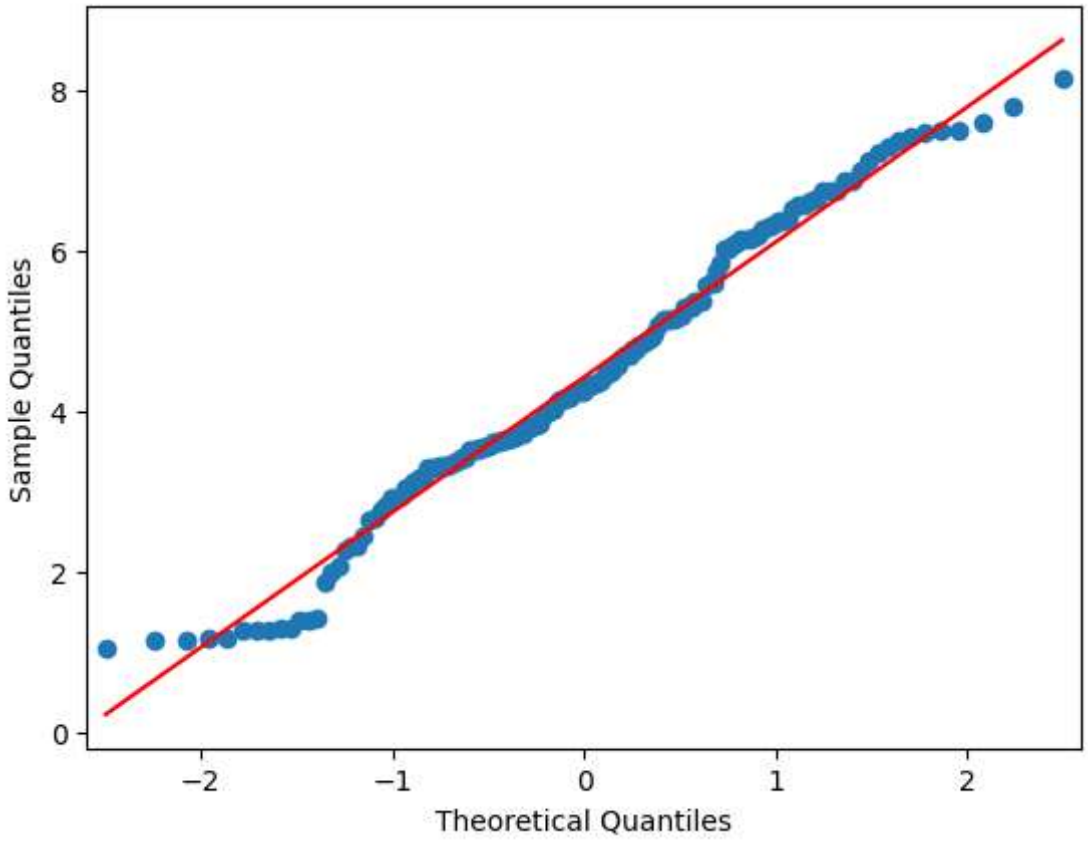
Length3



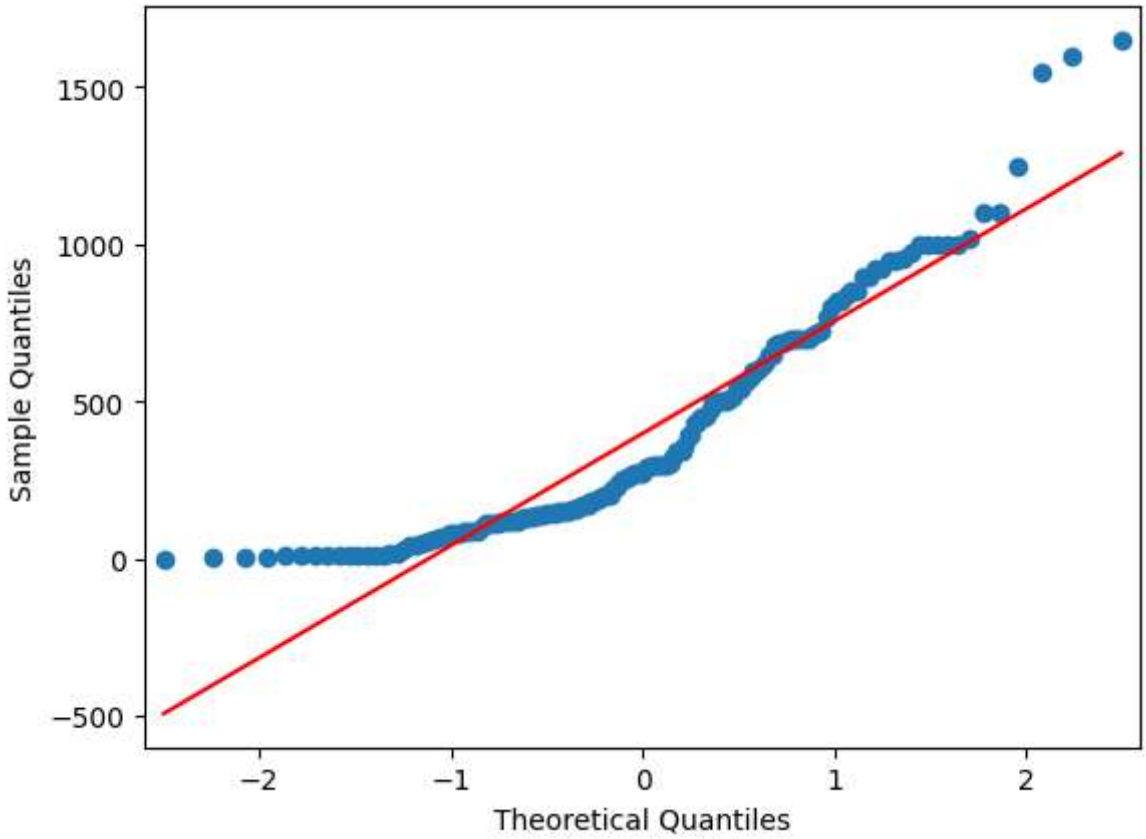
Height



Width

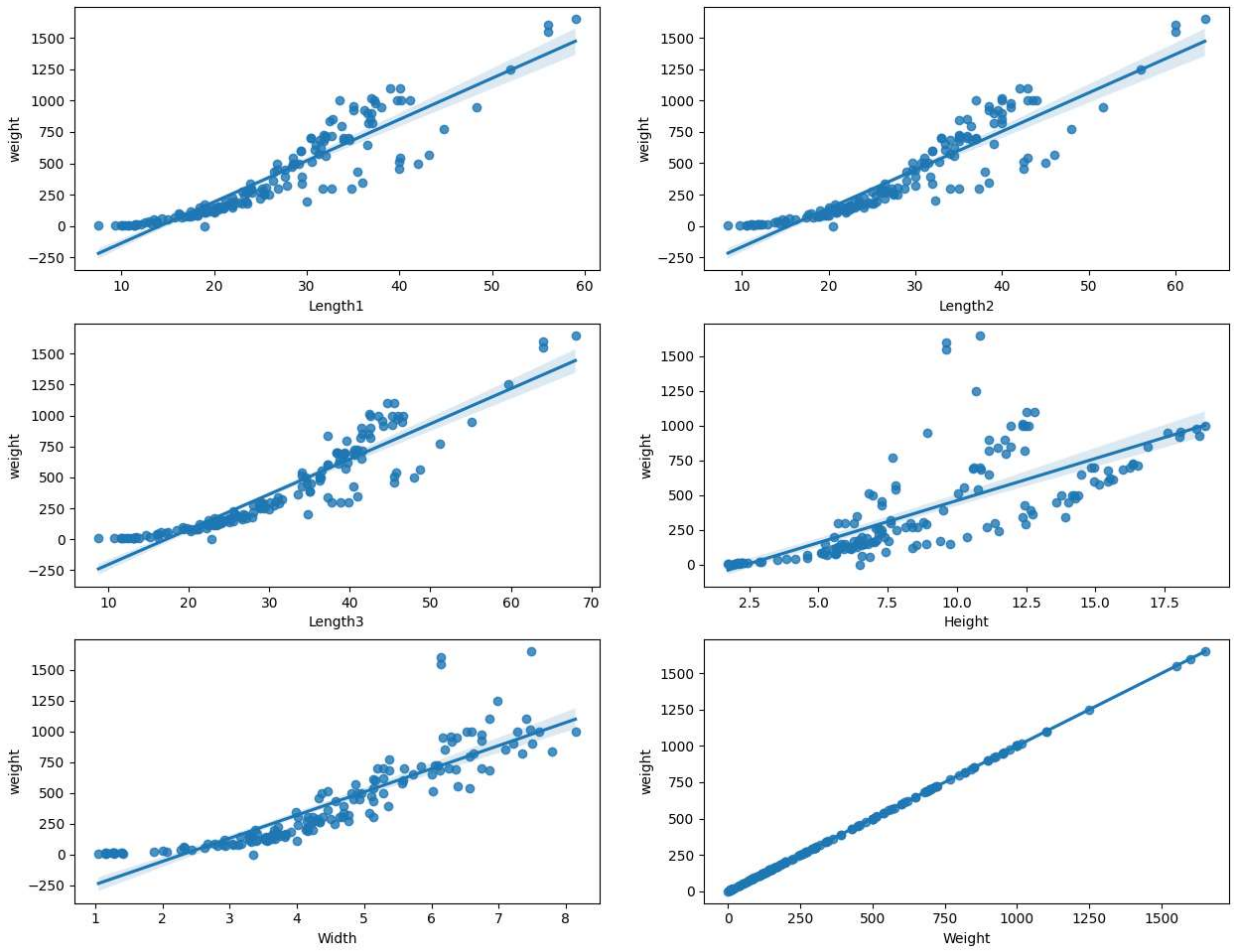


Weight



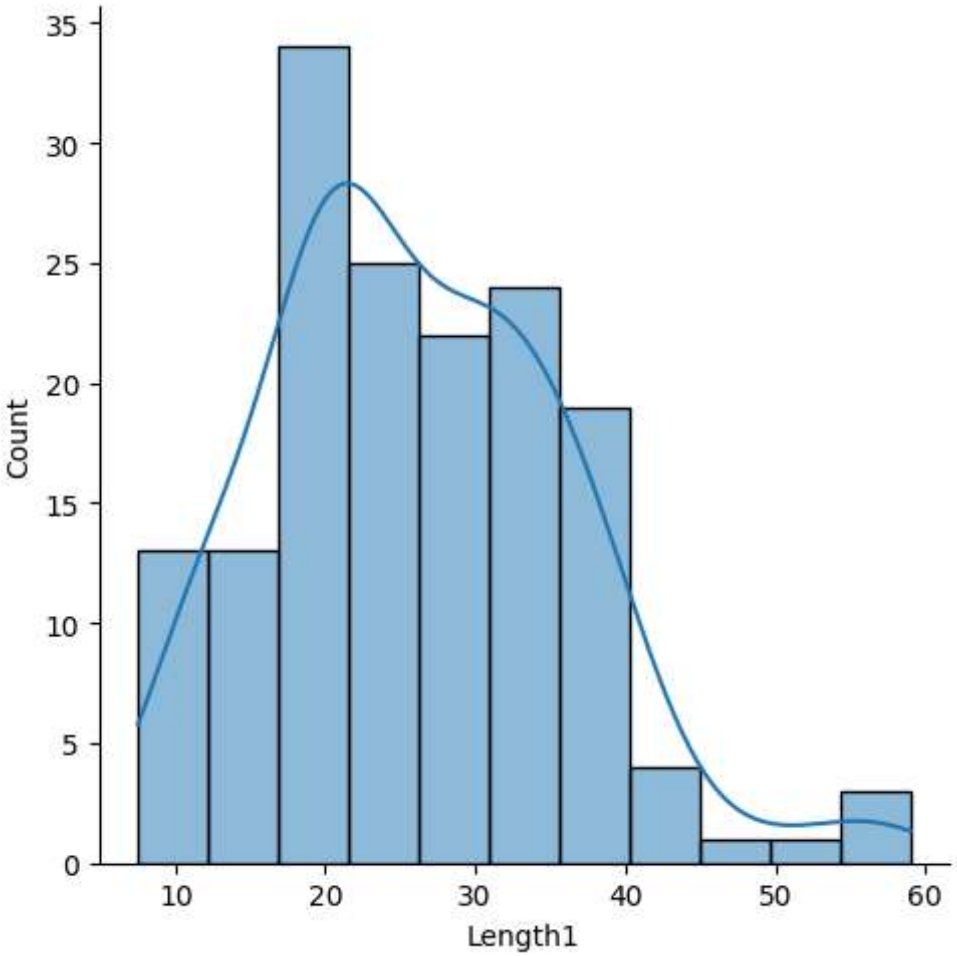
In [11]:
```
#Scatterplots - WEIGHT vs. Independent Variables

plt.figure(figsize = (15, 20))
```

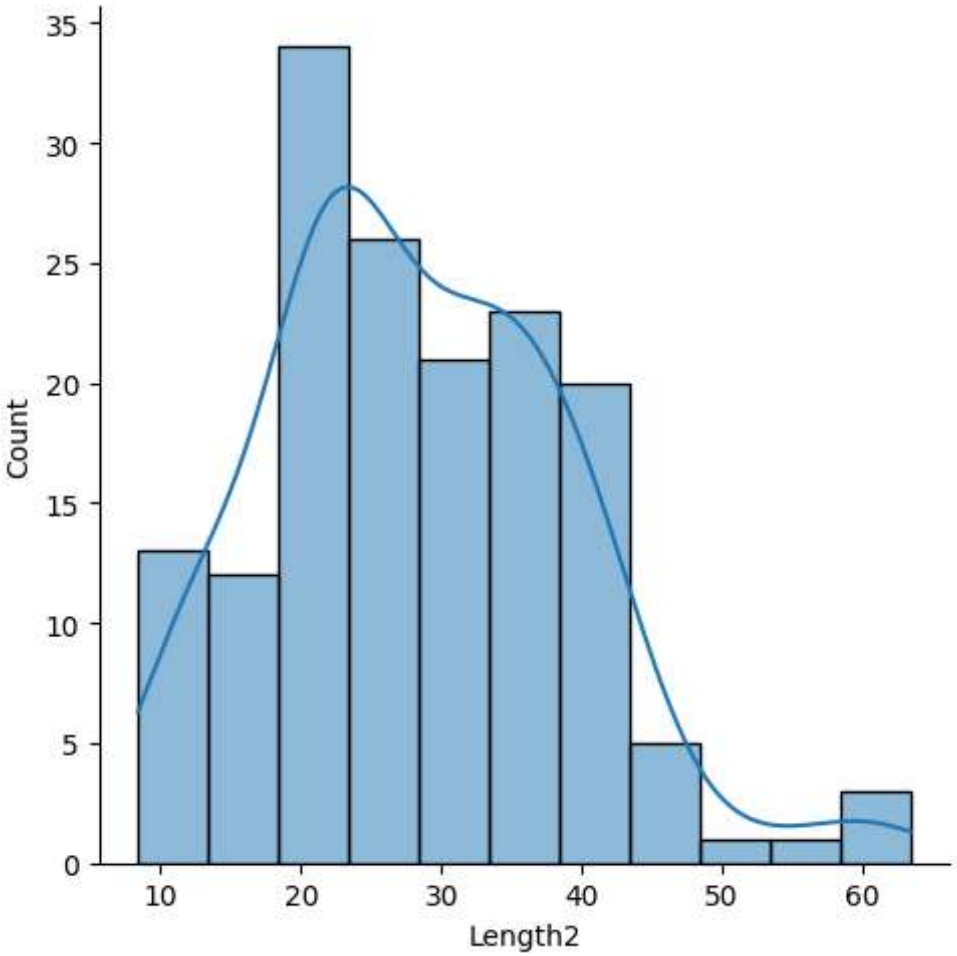
```
cnt = 1
for col in data.columns:
    if (col == 'weight'):
        continue

    plt.subplot(5, 2, cnt)
    lmgraph = sns.regplot(x = data[col], y = data.Weight)
    lmgraph.set_xlabel(col)
    lmgraph.set_ylabel('weight')
    cnt += 1
```

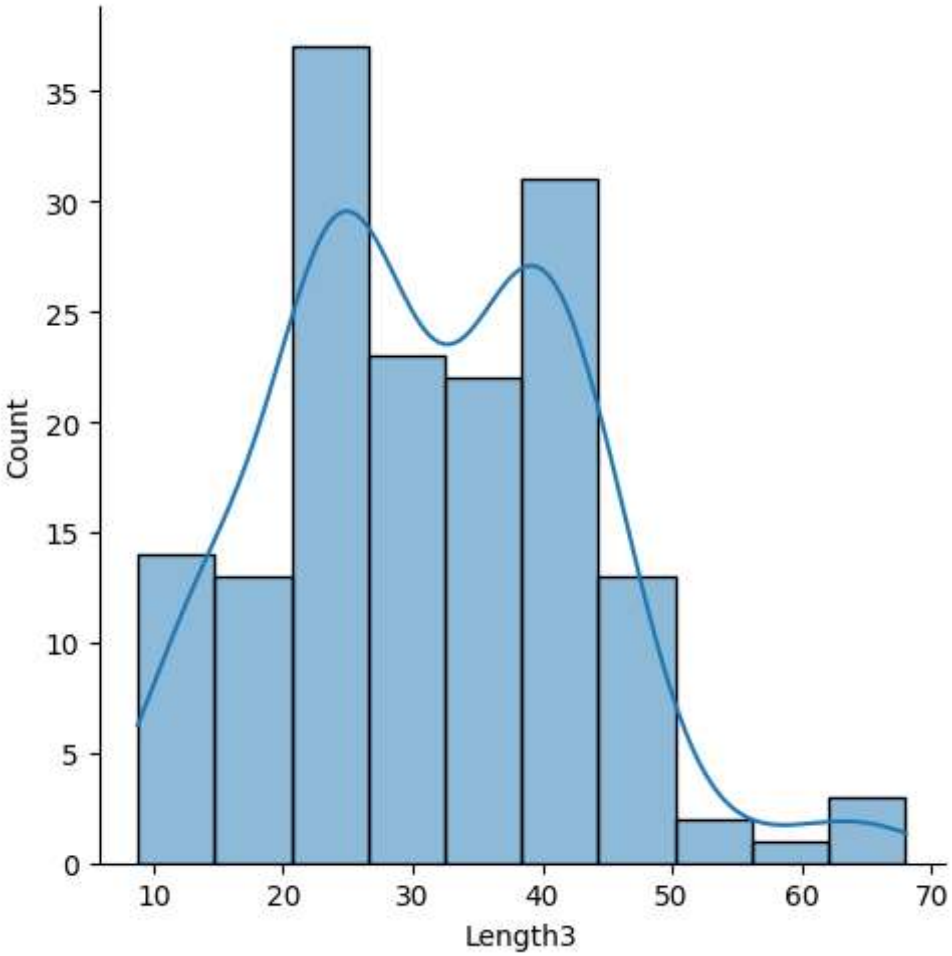


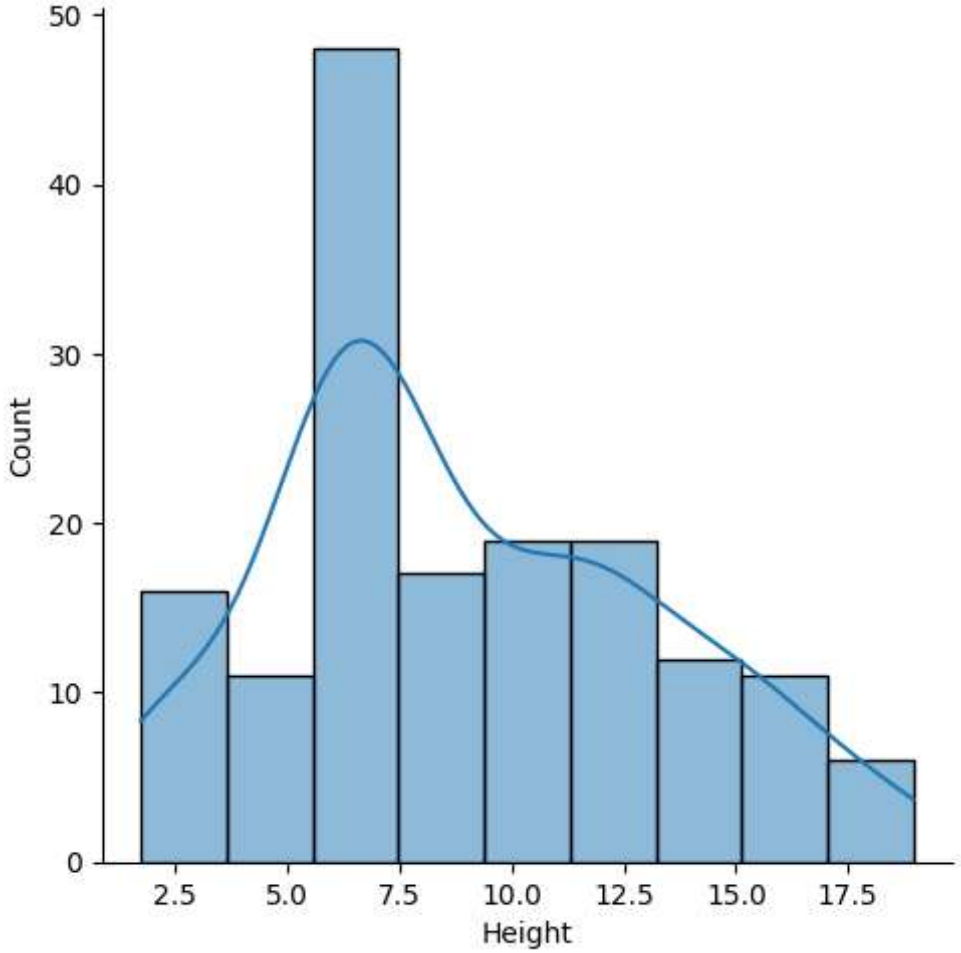
In [12]:
```
#Histogram with Distribution

plt.figure(figsize = (15, 20))

cnt = 1
for col in data.columns:
    lmgraphhist = sns.displot(x = data[col],kde=True)
    cnt += 1
```

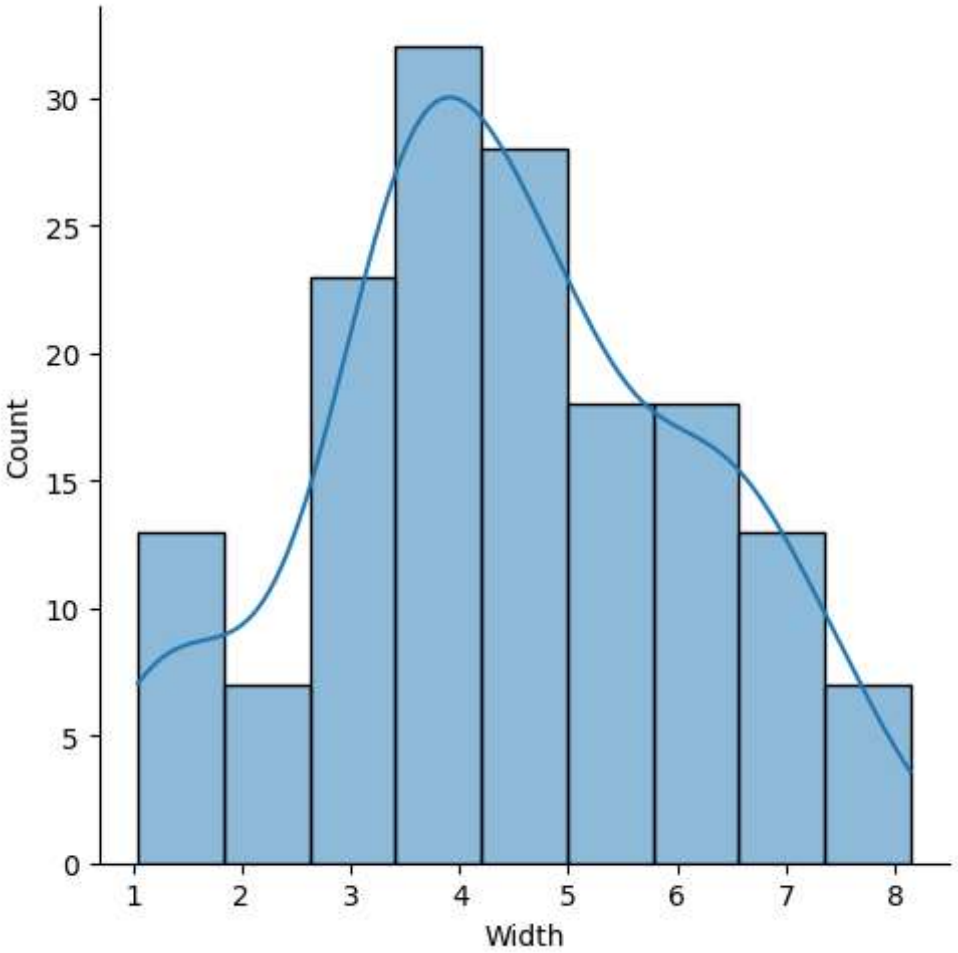
```
<Figure size 1500x2000 with 0 Axes>
```

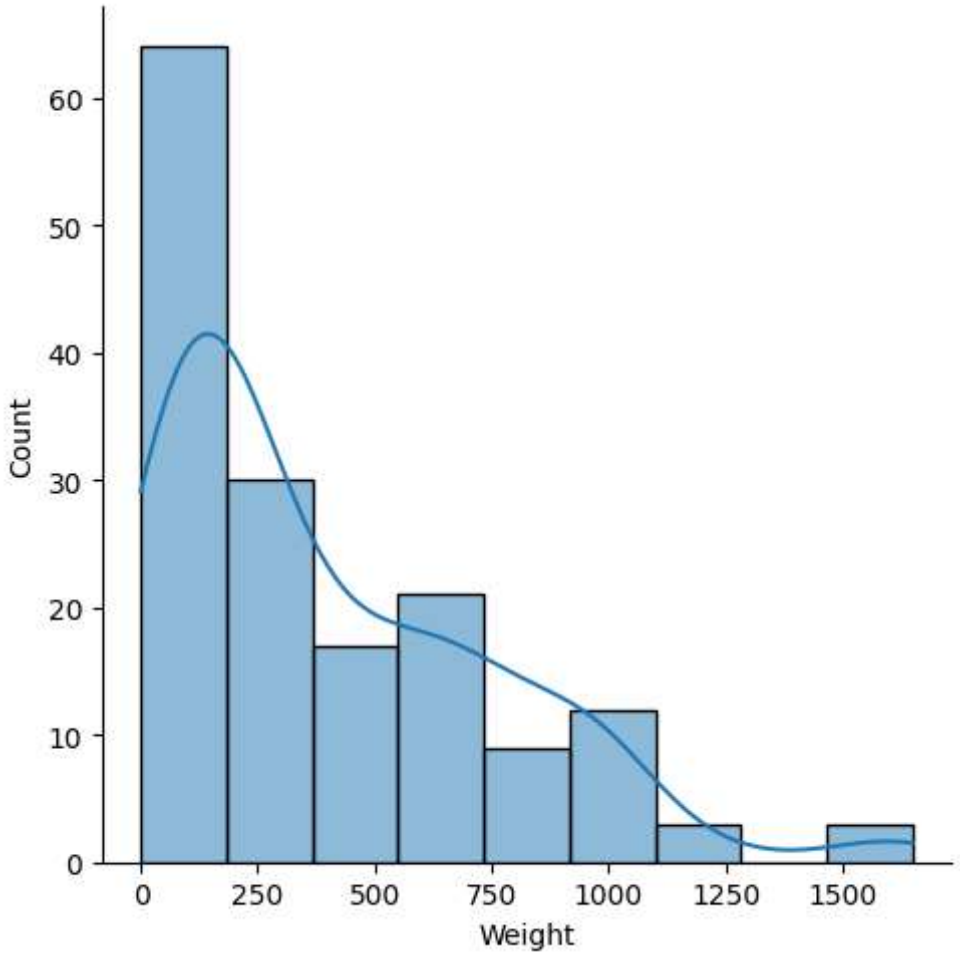

35
30
25
20
15
10
5
0
Count
10
20
30
40
50
60
Length1


35
30
25
20
15
10
5
0
Count
10
20
30
40
50
60
Length2


Count
35
30
25
20
15
10
5
0
10
20
30
40
50
60
70
Length3

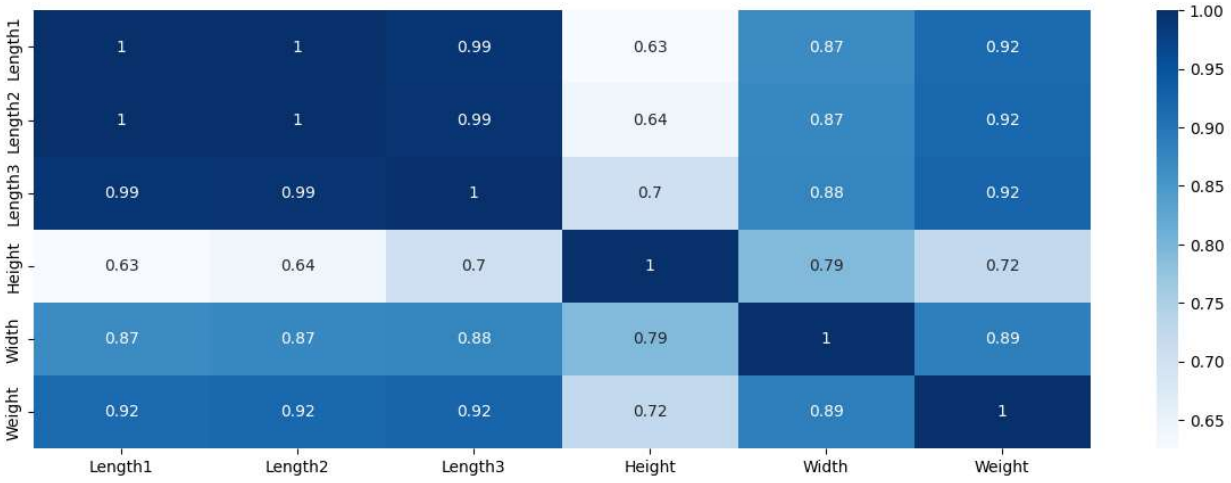

50
40
30
20
10
0
Count
2.5
5.0
7.5
10.0
12.5
15.0
17.5
Height


Count
30
25
20
15
10
5
0
1
2
3
4
5
6
7
8
Width



In [13]:
```
#Visualization of Correlations
fig = plt.figure(figsize=(15,5))
sns.heatmap(data.corr(),annot=True,cmap="Blues")
```

Out[13]: <AxesSubplot: >



In [14]:
```
#Define x and y variable
dataX = data.drop('Weight',axis=1)
```

In [15]:
```
dataX.head()
```

Out[15]:

	Length1	Length2	Length3	Height	Width
0	23.2	25.4	30.0	11.5200	4.0200
1	24.0	26.3	31.2	12.4800	4.3056
2	23.9	26.5	31.1	12.3778	4.6961
3	26.3	29.0	33.5	12.7300	4.4555
4	26.5	29.0	34.0	12.4440	5.1340

In [16]:
```
#Define x and y variable
x = dataX.to_numpy()
y = data['Weight'].to_numpy()

#Create Train and Test Datasets
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.2,random_state=100)

#Scale the Data
from sklearn.preprocessing import StandardScaler
sc = StandardScaler()
x_train2 = sc.fit_transform(x_train)
x_test2 = sc.transform(x_test)
```

In [17]:
```
#Script for Linear Regression
from sklearn.linear_model import LinearRegression
from sklearn import metrics

for name,method in [('Linear Regression', LinearRegression())]:
    method.fit(x_train2,y_train)
    predict = method.predict(x_test2)

print('Method: {}'.format(name))

#Coefficents
print('\nIntercept: {:0.2f}'.format(float(method.intercept_)))
coeff_table=pd.DataFrame(np.transpose(method.coef_),dataX.columns,columns=['Coefficier
print('\n')
print(coeff_table)

#MAE,MSE and RMSE
print('\nR2: {:0.2f}'.format(metrics.r2_score(y_test, predict)))
adjusted_r_squared2 = 1-(1-metrics.r2_score(y_test,predict))*(len(y)-1)/(len(y)-x.shap
print('Adj_R2: {:0.2f}'.format(adjusted_r_squared2))

print('\nMean Absolute Error: {:0.2f}'.format(metrics.mean_absolute_error(y_test, prec
print('Mean Squared Error: {:0.2f}'.format(metrics.mean_squared_error(y_test, predict)
print('Root Mean Squared Error: {:0.2f}'.format(np.sqrt(metrics.mean_squared_error(y_t
```

```
Method: Linear Regression

Intercept: 391.49


         Coefficients
Length1    730.194257
Length2   -278.055260
Length3   -222.638571
Height      90.630688
Width       50.133149

R2: 0.90
Adj_R2: 0.90

Mean Absolute Error: 94.67
Mean Squared Error: 12283.93
Root Mean Squared Error: 110.83
```

In [18]:
```
#Forecast Table
predict2 = predict.T
diff = predict2-y_test
FcstTble=pd.DataFrame({'Actual':y_test,'Predicted':predict2.round(1),'Difference':diff
print('\nForecast Table')
FcstTble.head()
```

```
Forecast Table
```

Out[18]:

	Actual	Predicted	Difference
0	160.0	184.4	24.4
1	500.0	545.1	45.1
2	1000.0	949.3	-50.7
3	600.0	598.2	-1.8
4	390.0	472.3	82.3

In [ ]: