Assignment -3

Python Programming

Assignment Date	9 October 2022
Student Name	M.karthikeyan
Student Roll Number	621319106310
Maximum Marks	2 Marks

Question-1:

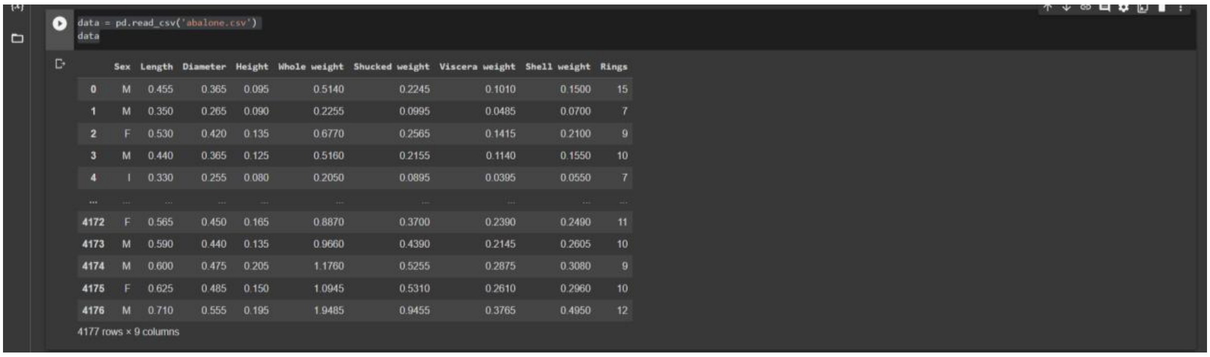
AFTER DOWNLOADING THE DATASET ,IMPORT NECESSARY LIBRARIES

```
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.linear_model import LinearRegression
from sklearn.tree import DecisionTreeRegressor
```

LOAD THE DATASET

```
data = pd.read_csv('abalone.csv')
data
```

Solution:



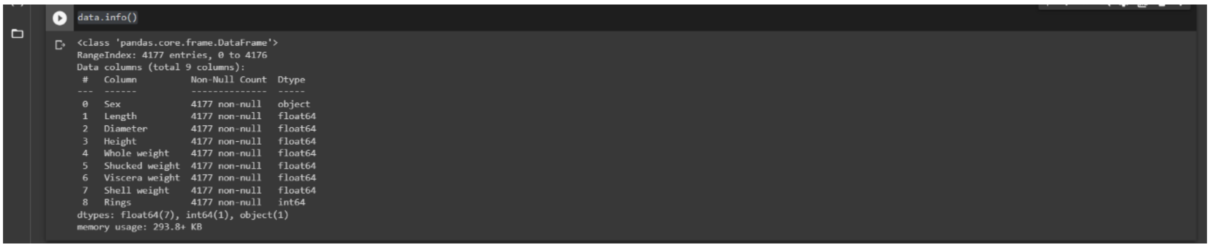
```
data = pd.read_csv('abalone.csv')
data
```

	Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings
0	M	0.455	0.365	0.095	0.5140	0.2245	0.1010	0.1500	15
1	M	0.350	0.265	0.090	0.2255	0.0995	0.0485	0.0700	7
2	F	0.530	0.420	0.135	0.6770	0.2565	0.1415	0.2100	9
3	M	0.440	0.365	0.125	0.5160	0.2155	0.1140	0.1550	10
4	I	0.330	0.255	0.080	0.2050	0.0895	0.0395	0.0550	7
...	...	...	...	...	...	...	...	...	...
4172	F	0.565	0.450	0.165	0.8870	0.3700	0.2390	0.2490	11
4173	M	0.590	0.440	0.135	0.9660	0.4390	0.2145	0.2605	10
4174	M	0.600	0.475	0.205	1.1760	0.5255	0.2875	0.3080	9
4175	F	0.625	0.485	0.150	1.0945	0.5310	0.2610	0.2960	10
4176	M	0.710	0.555	0.195	1.9485	0.9455	0.3765	0.4950	12

4177 rows × 9 columns

```
data.info()
```

Solution:

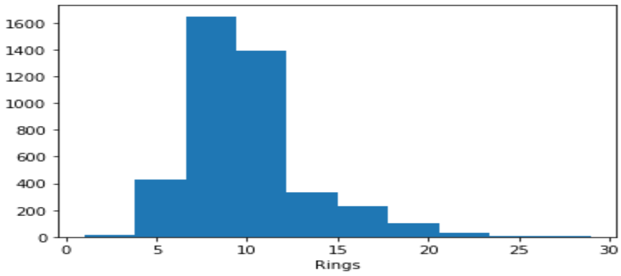


```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 4177 entries, 0 to 4176
Data columns (total 9 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   Sex             4177 non-null   object
 1   Length          4177 non-null   float64
 2   Diameter        4177 non-null   float64
 3   Height          4177 non-null   float64
 4   Whole weight    4177 non-null   float64
 5   Shucked weight  4177 non-null   float64
 6   Viscera weight  4177 non-null   float64
 7   Shell weight    4177 non-null   float64
 8   Rings           4177 non-null   int64
dtypes: float64(7), int64(1), object(1)
memory usage: 293.8+ KB
```

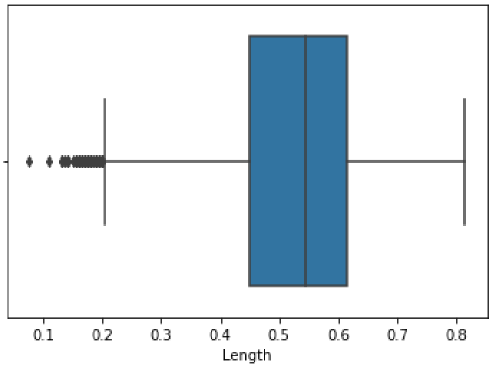
```
plt.hist(data['Rings']);
plt.xlabel('Rings');
```

Solution:



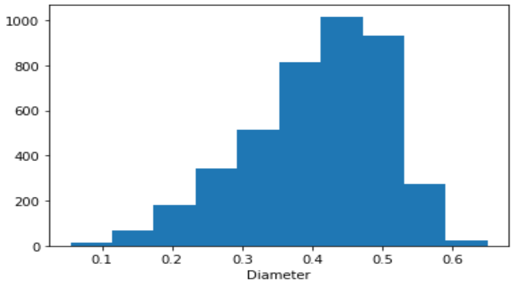
```
sns.boxplot(x=data['Length'])
plt.xlabel('Length');
```

Solution:



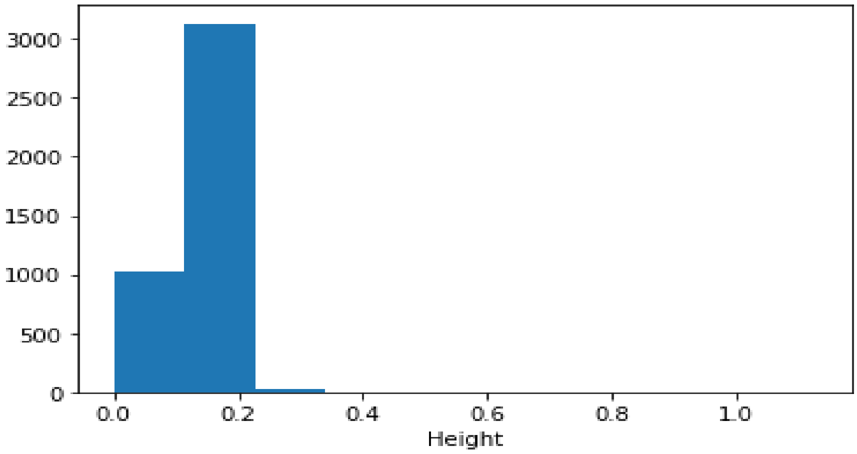
```
plt.hist(data['Diameter']);
plt.xlabel('Diameter');
```

Solution:



```
plt.hist(data['Height']);
plt.xlabel('Height');
```

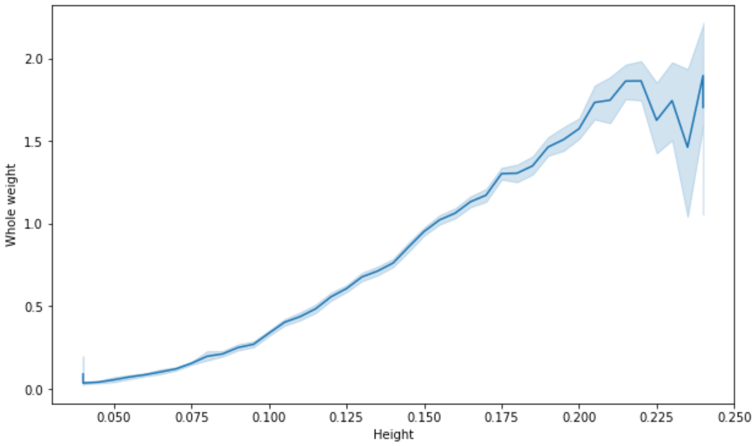
Solution:

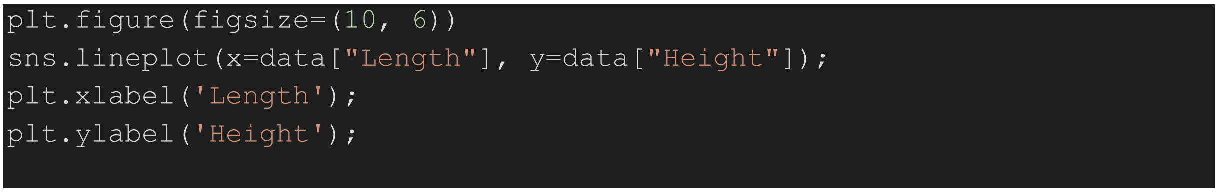


Question-2:

```
#Bivariate Analysis
plt.figure(figsize=(10, 6))
sns.lineplot(x=data["Height"], y=data["Whole weight"]);
plt.xlabel('Height');
plt.ylabel('Whole weight');
```

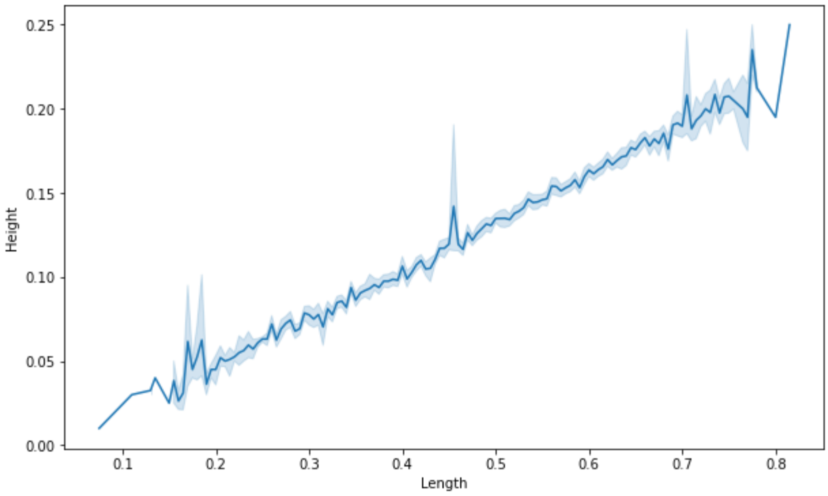
Solution:

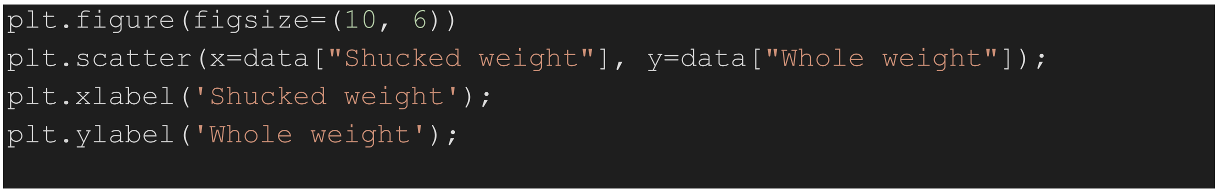




```
plt.figure(figsize=(10, 6))
sns.lineplot(x=data["Length"], y=data["Height"]);
plt.xlabel('Length');
plt.ylabel('Height');
```

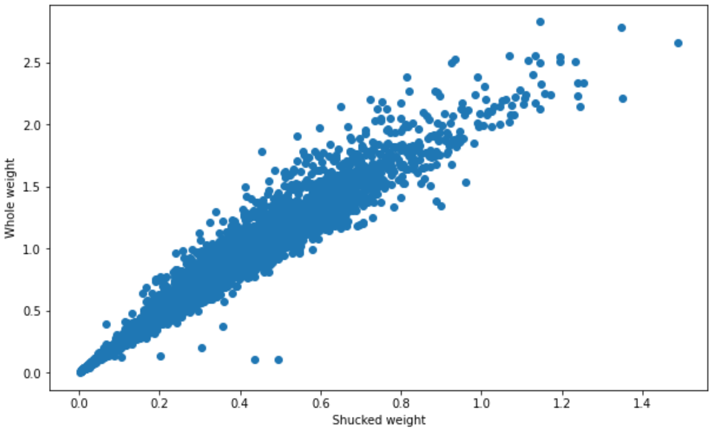
Solution:





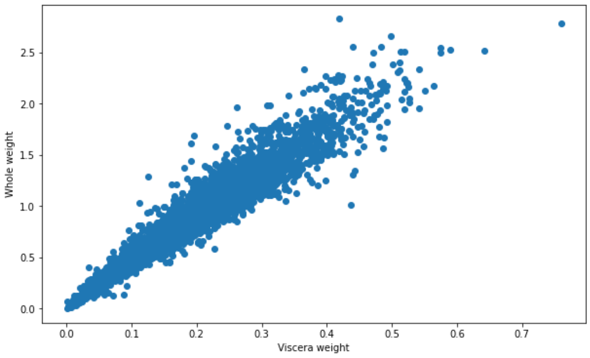
```
plt.figure(figsize=(10, 6))
plt.scatter(x=data["Shucked weight"], y=data["Whole weight"]);
plt.xlabel('Shucked weight');
plt.ylabel('Whole weight');
```

Solution:



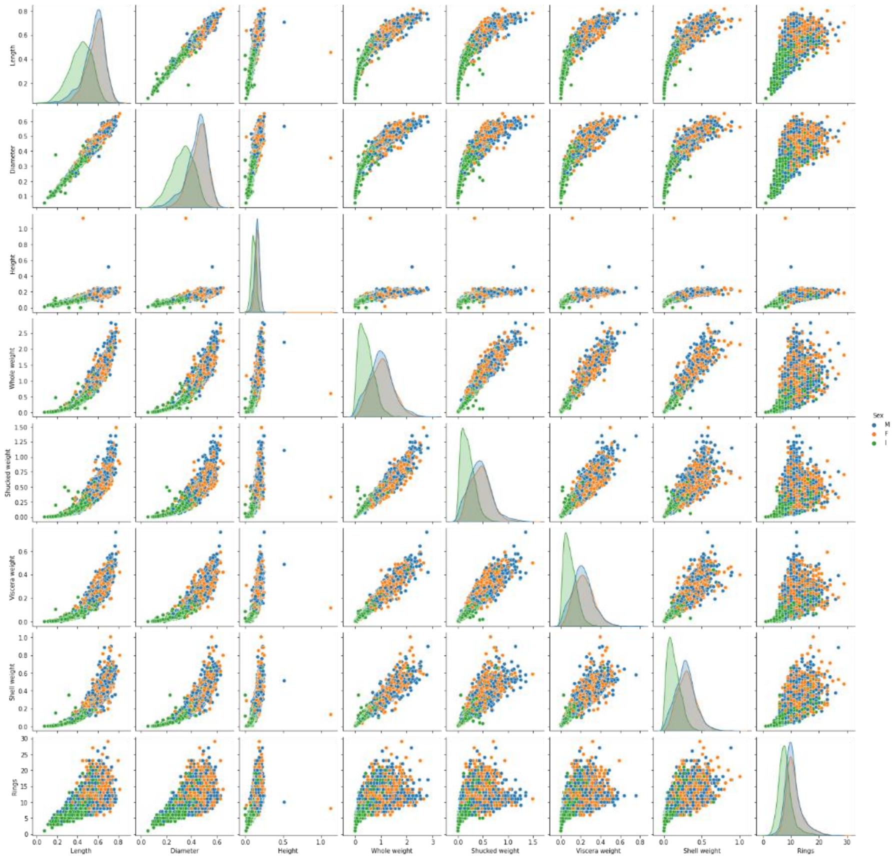
```
plt.figure(figsize=(10, 6))
plt.scatter(x=data["Viscera weight"], y=data["Whole weight"]);
plt.xlabel('Viscera weight');
plt.ylabel('Whole weight');
```

Solution:



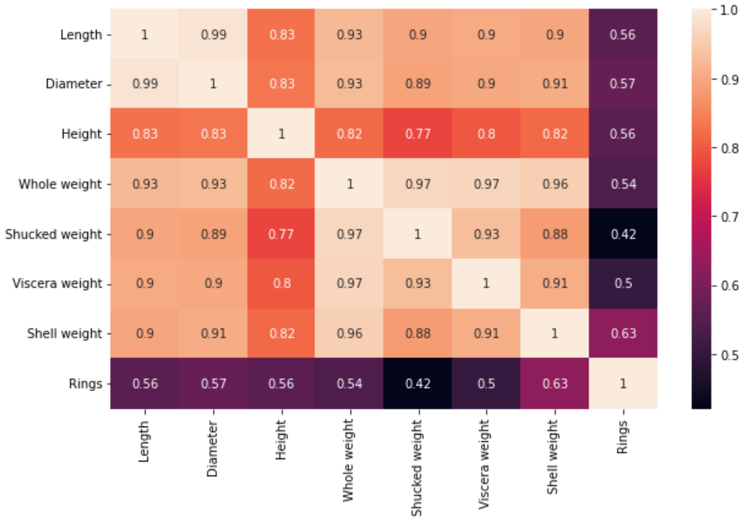
Question-3:

```
#Multi-variate Analysis
sns.pairplot(data, hue='Sex');
```



```
plt.figure(figsize=(10, 6));
sns.heatmap(data.corr(), annot=True);
```

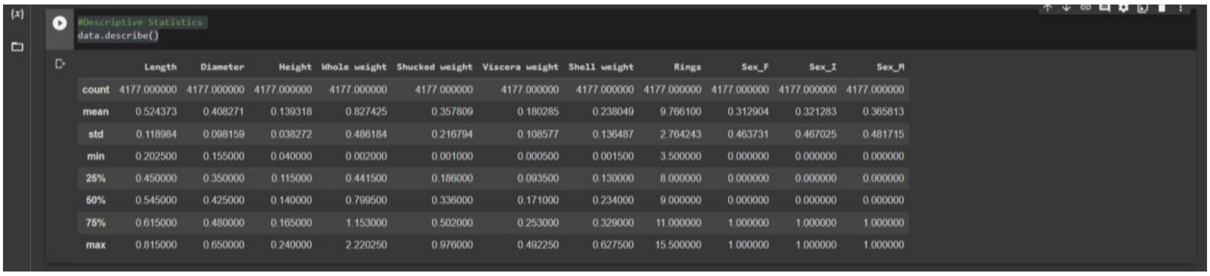
Solution:



Question-4:

```
#Descriptive Statistics
data.describe()
```

Solution:



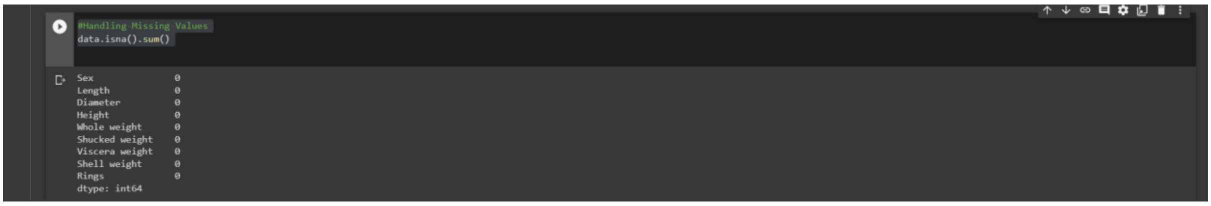
```
#Descriptive Statistics
data.describe()
```

```
            Length     Diameter       Height  Whole weight  Shucked weight  Viscera weight  Shell weight        Rings        Sex_F        Sex_I        Sex_M
count  4177.000000  4177.000000  4177.000000   4177.000000     4177.000000     4177.000000   4177.000000  4177.000000  4177.000000  4177.000000  4177.000000
mean      0.524373     0.408271     0.139318      0.827425        0.357809        0.180285      0.238049     9.766100     0.312904     0.321283     0.365813
std       0.118984     0.098159     0.038272      0.486184        0.216794        0.108577      0.136487     2.764243     0.463731     0.467025     0.481715
min       0.202500     0.155000     0.040000      0.002000        0.001000        0.000500      0.001500     3.500000     0.000000     0.000000     0.000000
25%       0.450000     0.350000     0.115000      0.441500        0.186000        0.093500      0.130000     8.000000     0.000000     0.000000     0.000000
50%       0.545000     0.425000     0.140000      0.799500        0.336000        0.171000      0.234000     9.000000     0.000000     0.000000     0.000000
75%       0.615000     0.480000     0.165000      1.153000        0.502000        0.253000      0.329000    11.000000     1.000000     1.000000     1.000000
max       0.815000     0.650000     0.240000      2.220250        0.976000        0.492250      0.627500    15.500000     1.000000     1.000000     1.000000
```

Question-5:

```
#Handling Missing Values
data.isna().sum()
```

Solution:



```
#Handling Missing Values
data.isna().sum()
```

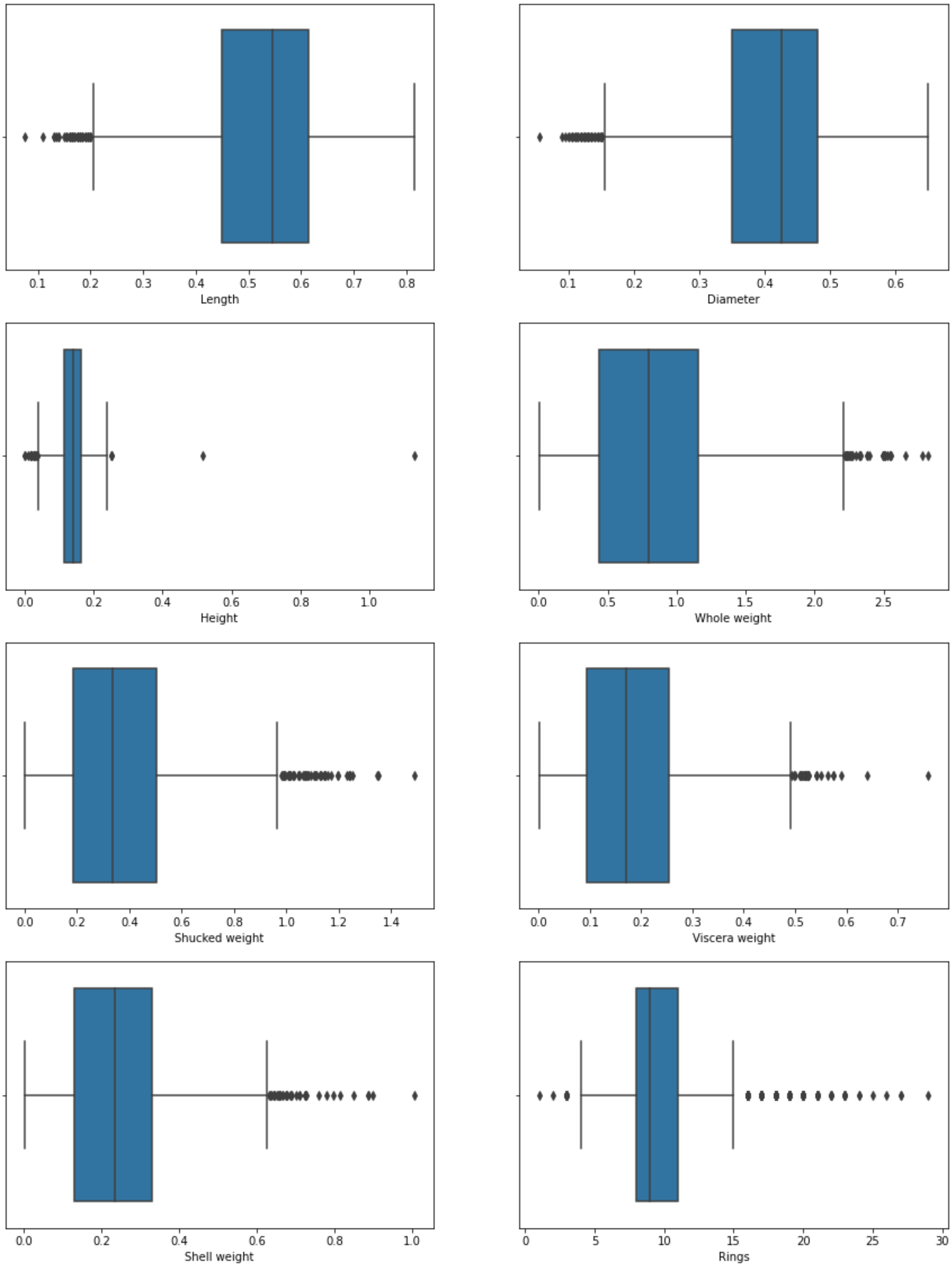
```
Sex               0
Length            0
Diameter          0
Height            0
Whole weight      0
Shucked weight    0
Viscera weight    0
Shell weight      0
Rings             0
dtype: int64
```

Question-6:

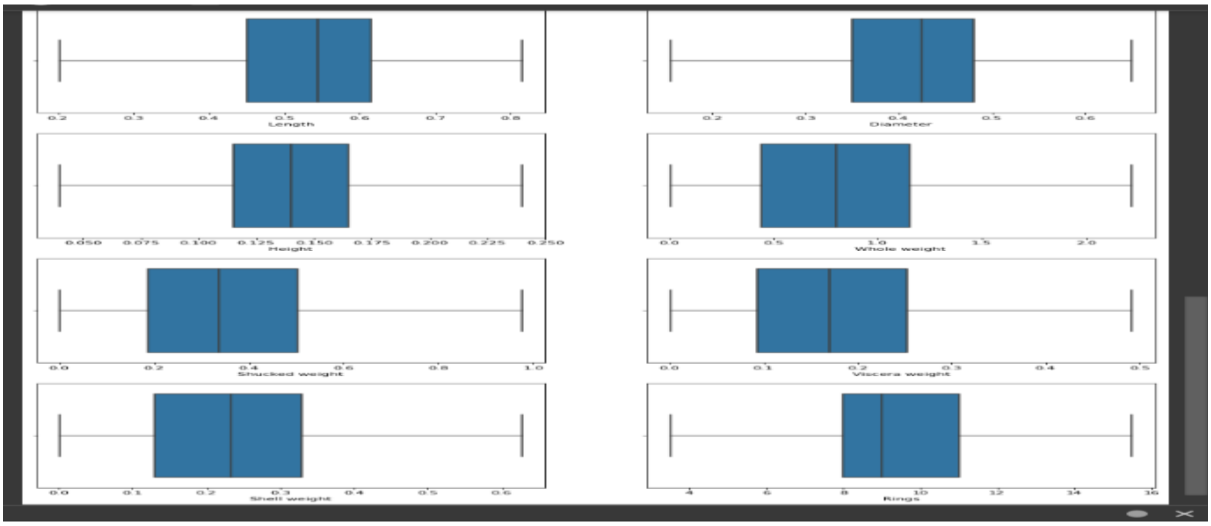
```
#Outlier Handling
numeric_cols = ['Length', 'Diameter', 'Height', 'Whole weight', 'Shucked weight', 'Viscera weight', 'Shell weight', 'Rings']

def boxplots(cols):
    fig, axes = plt.subplots(4, 2, figsize=(15, 20))

    t=0
    for i in range(4):
        for j in range(2):
            sns.boxplot(ax=axes[i][j], data=data, x=cols[t])
            t+=1

    plt.show()
def Flooring_outlier(col):
    Q1 = data[col].quantile(0.25)
    Q3 = data[col].quantile(0.75)
    IQR = Q3 - Q1
    whisker_width = 1.5
    lower_whisker = Q1 -(whisker_width*IQR)
    upper_whisker = Q3 + (whisker_width*IQR)
    data[col]=np.where(data[col]>upper_whisker,upper_whisker,np.where(data[col]<lower_whisker,lower_whisker,data[col]))
print('Before Outliers Handling')
print('='*100)
boxplots(numeric_cols)
for col in numeric_cols:
    Flooring_outlier(col)
print('\n\n\nAfter Outliers Handling')
print('='*100)
boxplots(numeric_cols)
```

Solution:

Before Outliers Handling



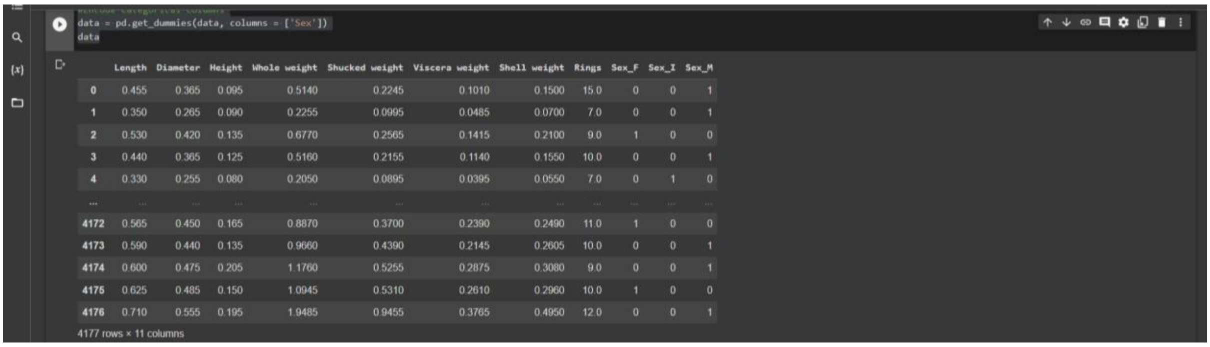
After Outliers Handling



Question-7:

```
#Encode Categorical Columns
data = pd.get_dummies(data, columns = ['Sex'])
data
```

Solution:



```
#Encode Categorical Columns
data = pd.get_dummies(data, columns = ['Sex'])
data
```

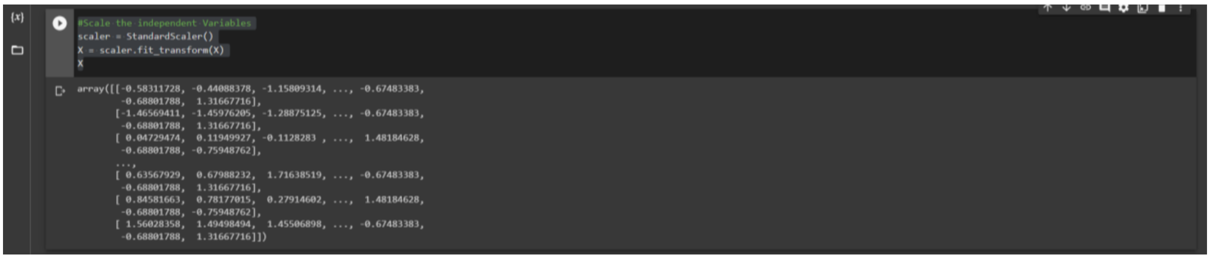
	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings	Sex_F	Sex_I	Sex_M
0	0.455	0.365	0.095	0.5140	0.2245	0.1010	0.1500	15.0	0	0	1
1	0.350	0.265	0.090	0.2255	0.0995	0.0485	0.0700	7.0	0	0	1
2	0.530	0.420	0.135	0.6770	0.2565	0.1415	0.2100	9.0	1	0	0
3	0.440	0.365	0.125	0.5160	0.2155	0.1140	0.1550	10.0	0	0	1
4	0.330	0.255	0.080	0.2050	0.0895	0.0395	0.0550	7.0	0	1	0
...	...	...	...	...	...	...	...	...	...	...	...
4172	0.565	0.450	0.165	0.8870	0.3700	0.2390	0.2490	11.0	1	0	0
4173	0.590	0.440	0.135	0.9660	0.4390	0.2145	0.2605	10.0	0	0	1
4174	0.600	0.475	0.205	1.1760	0.5255	0.2875	0.3080	9.0	0	0	1
4175	0.625	0.485	0.150	1.0945	0.5310	0.2610	0.2960	10.0	1	0	0
4176	0.710	0.555	0.195	1.9485	0.9455	0.3765	0.4950	12.0	0	0	1

4177 rows × 11 columns

Question-8:

```
#Scale the independent Variables
scaler = StandardScaler()
X = scaler.fit_transform(X)
X
```

Solution:



```
#Scale the independent Variables
scaler = StandardScaler()
X = scaler.fit_transform(X)
X
```

```
array([[-0.58311728, -0.44088378, -1.15809314, ..., -0.67483383,
        -0.68801788,  1.31667716],
       [-1.46569411, -1.45976205, -1.28875125, ..., -0.67483383,
        -0.68801788,  1.31667716],
       [ 0.04729474,  0.11949927, -0.1128283 , ...,  1.48184628,
        -0.68801788, -0.75948762],
       ...,
       [ 0.63567929,  0.67988232,  1.71638519, ..., -0.67483383,
        -0.68801788,  1.31667716],
       [ 0.84581663,  0.78177015,  0.27914602, ...,  1.48184628,
        -0.68801788, -0.75948762],
       [ 1.56028358,  1.49498494,  1.45506898, ..., -0.67483383,
        -0.68801788,  1.31667716]])
```

```
#Train Test Split
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size=0.2
, random_state=42)
X_train.shape, X_test.shape, Y_train.shape, Y_test.shape
```

Solution:

```
((3341, 10), (836, 10), (3341, 1), (836, 1
```

Question-9:

```
#Model Training & Testing
model = LinearRegression()
model.fit(X_train, Y_train)
model.score(X_train, Y_train), model.score(X_test, Y_test)
```

Solution:

```
(0.5743537797259437, 0.574066914479568)
```

```
model = DecisionTreeRegressor(max_depth=15, max_leaf_nodes=40)
model.fit(X_train, Y_train)
model.score(X_train, Y_train), model.score(X_test, Y_test)
```

Solution:

```
(0.6299341126842184, 0.5533377990647702)
```