Assignment -3

Assignment Date	01 October 2022
Student Name	Bogar S
Student Roll Number	811519104018
Maximum Marks	2 Marks

[1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

[2]:
```
d=pd.read_csv("abalone.csv")
d.head()
```

[2]:

	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	0.150	15
1	M	0.350	0.265	0.090	0.2255	0.0995	0.0485	0.070	7
2	F	0.530	0.420	0.135	0.6770	0.2565	0.1415	0.210	9
3	M	0.440	0.365	0.125	0.5160	0.2155	0.1140	0.155	10
4	I	0.330	0.255	0.080	0.2050	0.0895	0.0395	0.055	7

[3]:
```
d.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-   float64
     null
 6   Viscera weight 4177 non-   float64
     null
 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
```

[7]:
```
for i in d.columns:
    print(d[i].value_counts())
```

```
M   1528
I   1342
F   1307
Name: Sex, dtype: int64
0.625  94
0.550  94
0.575  93
0.580  92
0.600   87
        ..
0.075  1 0.815
 1 0.110    1
0.150  1
0.800    1
Name: Length, Length: 134, dtype: int64
0.450  139
0.475  120
0.400  111
0.500  110
0.470   100
       …
0.610  1 0.650
 1 0.620    1
0.095  1
0.615     1
Name: Diameter, Length: 111, dtype: int64
0.150  267
0.140  220
0.155  217
0.175  211
0.160  205
0.125  202
0.165  193
0.135  189
0.145  182
0.130  169
0.120  169
0.170  160
0.100  145
0.110   135
0.115  133
0.180  131
0.090  124
0.105  114
```

```
0.185 103
0.190 103
0.095  91 0.195
 78 0.080   76
0.085  74 0.200
 68 0.075   61
0.070  47 0.205
 45 0.065   39
0.215  31 0.060
 26 0.055   25
0.210  23 0.050
 18 0.220   17
0.040  13 0.225
 13 0.045   11
0.230  10
0.030   6 0.035
  6 0.235    6
0.025   5 0.240
  4 0.250    3
0.020   2 0.015
  2 0.000    2
0.010   1 0.515
  1
1.130     1
Name: Height, dtype: int64
0.2225   8

1.1345   7

0.9700   7

0.4775   7

0.1960   7

..

0.0475   1

1.8930   1

1.8725   1

2.1055   1

1.9485   1
Name: Whole weight, Length: 2429, dtype: int64
0.1750   11

0.2505   10

0.0970    9

0.0960    9
```

```
    0.4190    9
..
    0.4175    1
    0.1935    1
    0.1790    1
    0.1275    1
    0.9455    1
    Name: Shucked weight, Length: 1515, dtype: int64
    0.1715   15
    0.1960   14
    0.0575   13
    0.0610   13
    0.0370   13
..
    0.4270    1
    0.4075    1
    0.4920    1
    0.4650    1
    0.5260    1
    Name: Viscera weight, Length: 880, dtype: int64
    0.2750   43
    0.2500   42
    0.2650   40
    0.3150   40
    0.1850   40
..
    0.0060    1
    0.6460    1
    0.5010    1
    0.3295    1
    0.0920    1
    Name: Shell weight, Length: 926, dtype: int64
```

```
9     689
10    634
8     568
11    487
7     391
12    267
6     259
13    203
14    126
5     115
15     103
16      67
17      58
4      57
18      42
19      32
20      26
3      15
21      14
23       9
22       6
27       2
24       2
1        1
26       1
29       1
2        1
25       1
Name: Rings, dtype: int64
```

[8]:
```
d.isnull().sum()
```

[8]:
```
Sex               0
Length            0
Diameter          0
Height            0
Whole weight      0
Shucked weight    0
Viscera weight    0
Shell weight      0
Rings             0
dtype: int64
```

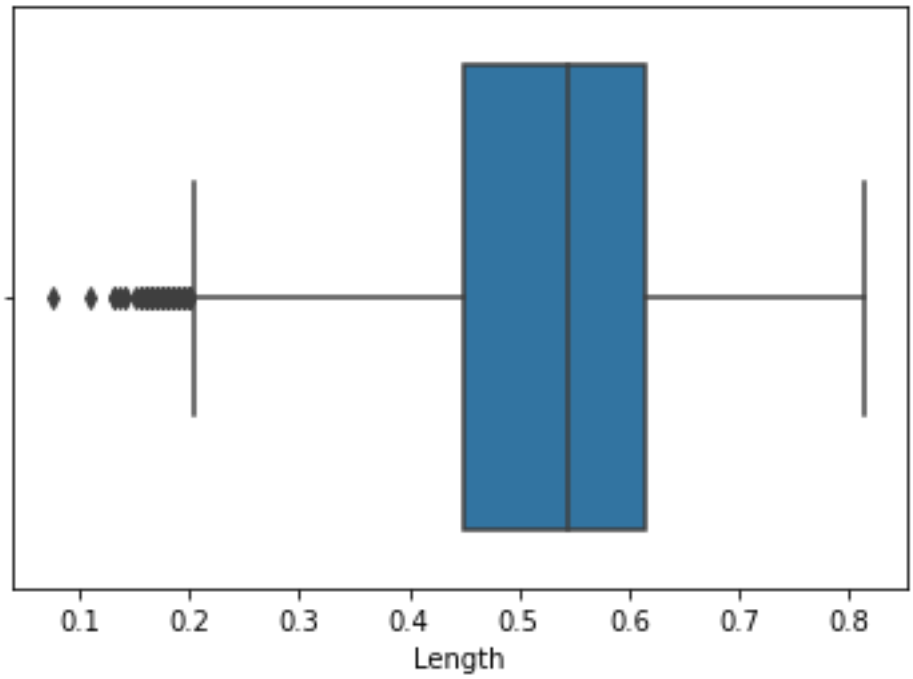
[9]:
```
d.duplicated().value_counts()
```

[9]:
```
False4177
dtype: int64
```

1 Data visualization(EDA Analysis)

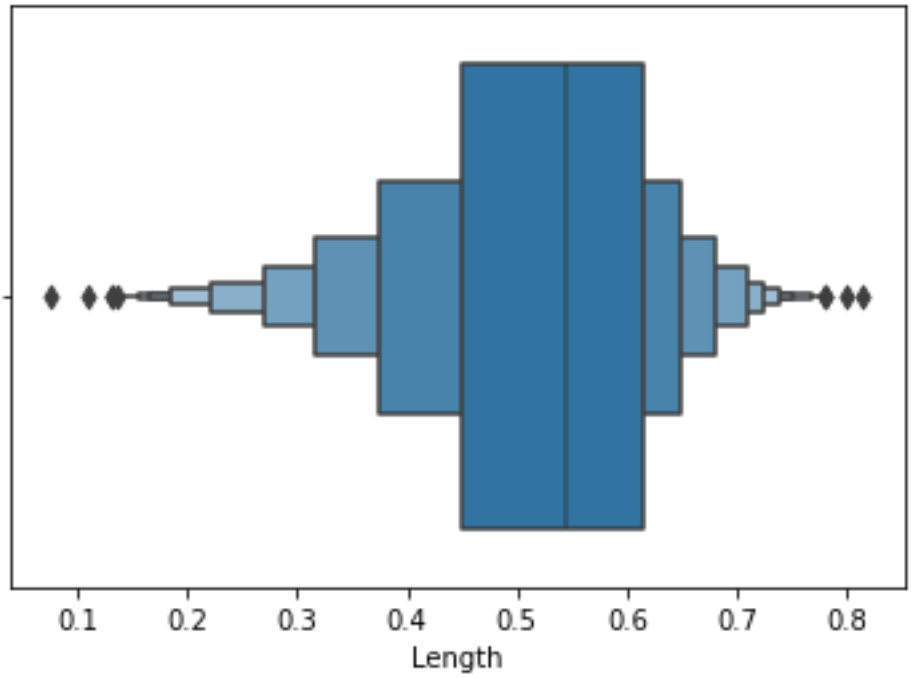
[12]:
```
sns.boxplot(data=d,x="Length")
```

[12]:
```
<AxesSubplot:xlabel='Length'>
```



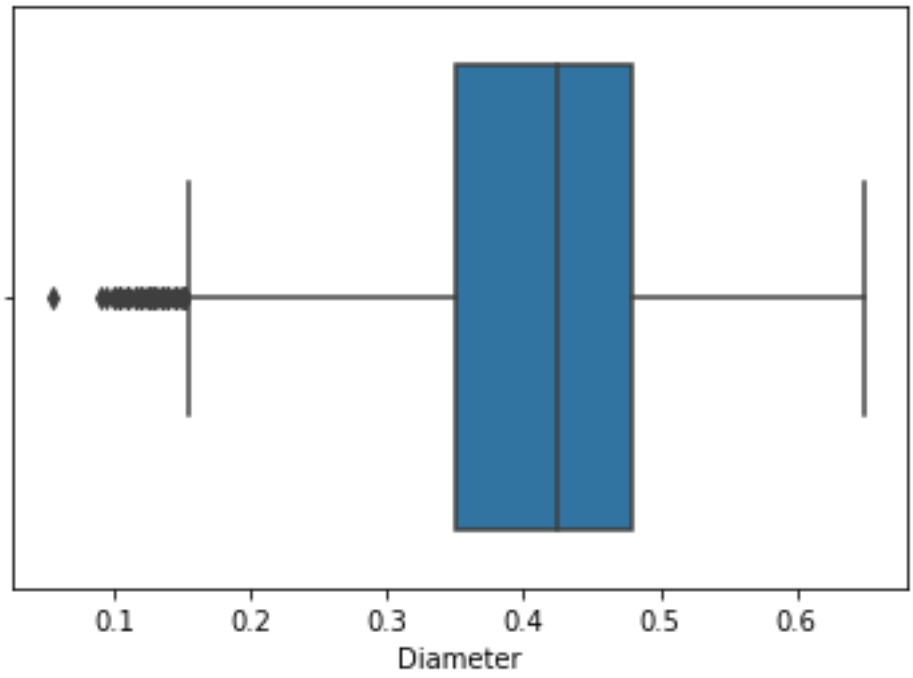
[13]:
```
sns.boxenplot(data=d,x="Length")
```

[13]:
```
<AxesSubplot:xlabel='Length'>
```


0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Length

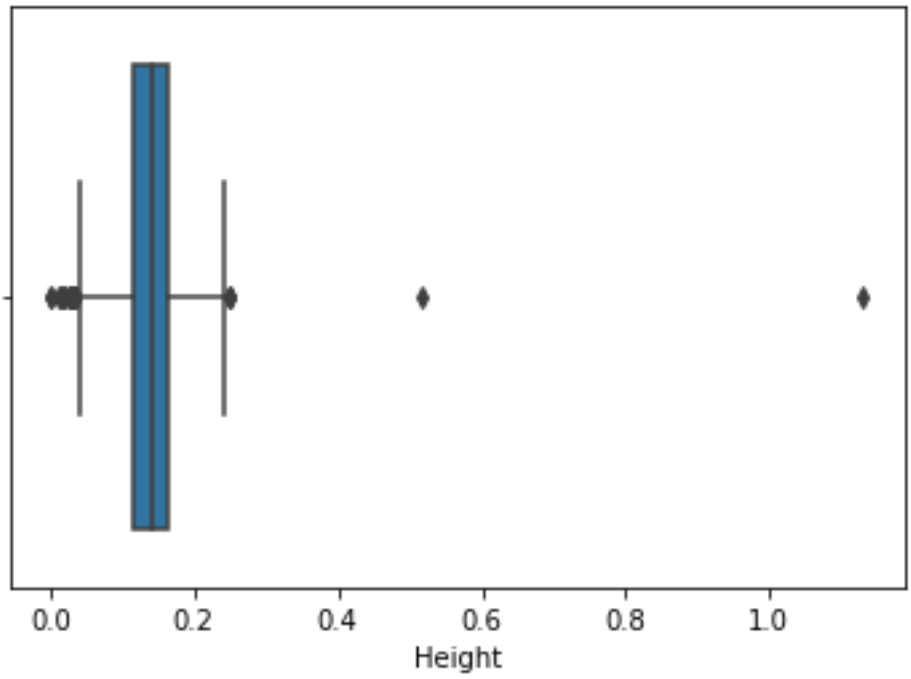
[16]:
```
sns.boxplot(data=d,x="Diameter")
```

[16]: <AxesSubplot:xlabel='Diameter'>



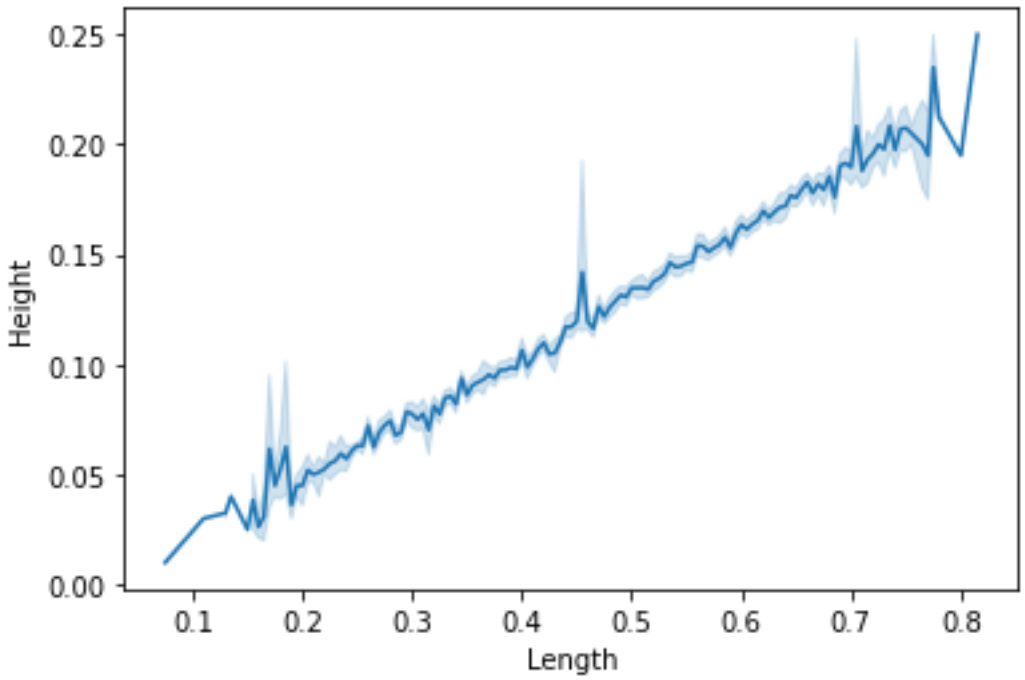
[18]:
```
sns.boxplot(data=d,x="Height")
```

[18]: <AxesSubplot:xlabel='Height'>



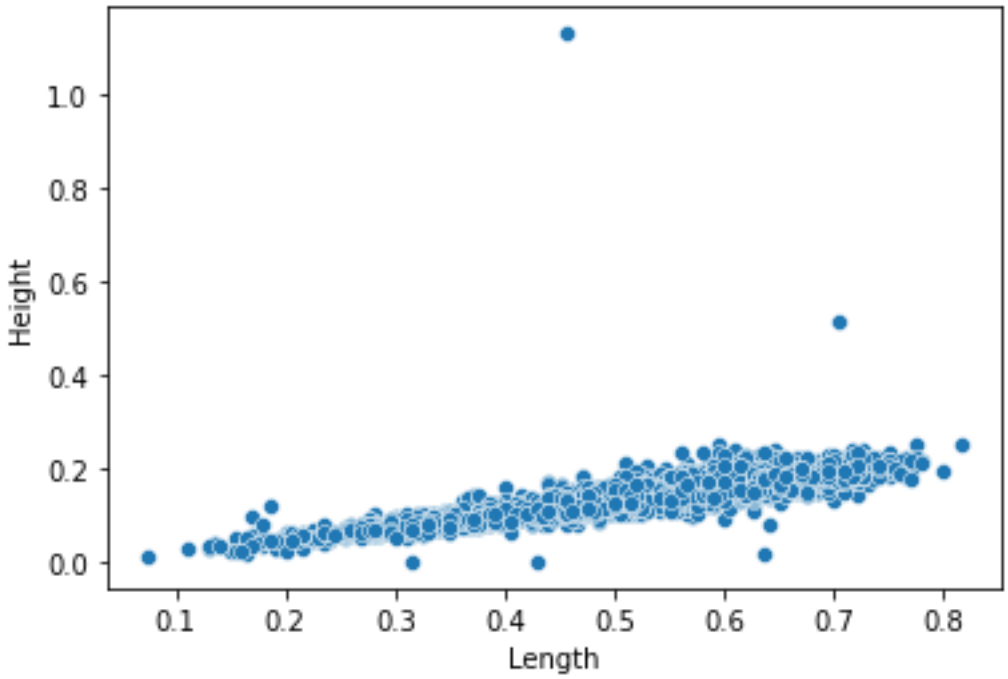
[20]:
```
sns.lineplot(data=d,x="Length",y="Height")
```

[20]: <AxesSubplot:xlabel='Length', ylabel='Height'>



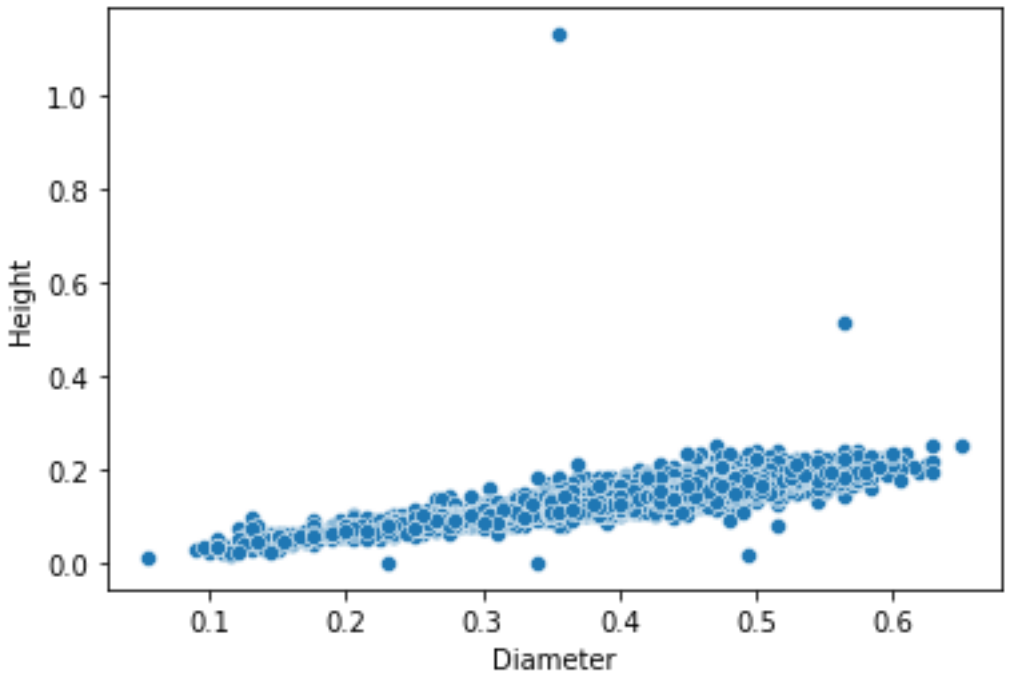
[21]:
```
sns.scatterplot(data=d,x="Length",y="Height")
```

[21]:
```
<AxesSubplot:xlabel='Length', ylabel='Height'>
```



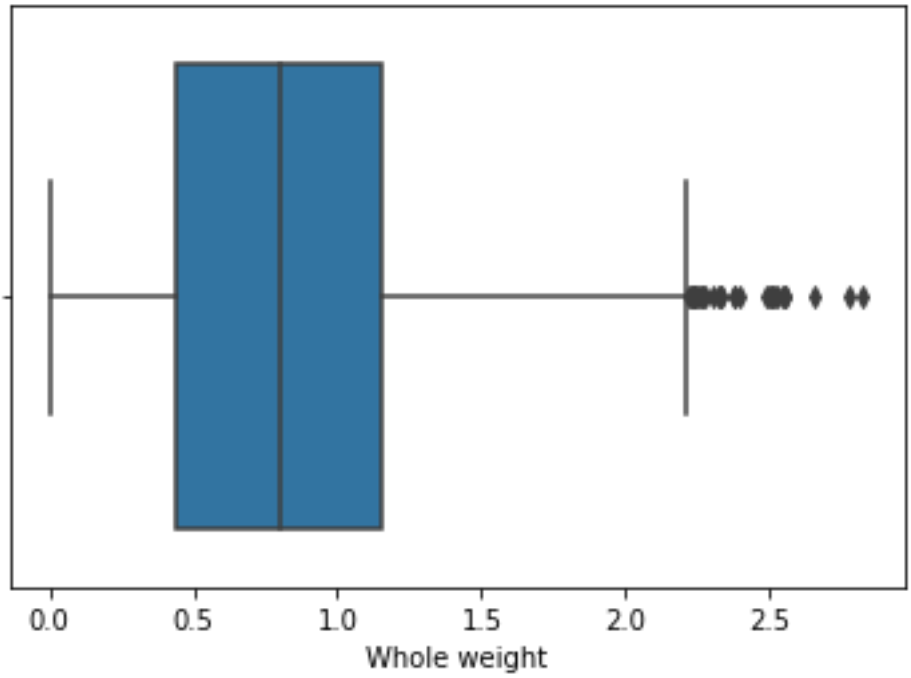
[22]:
```
sns.scatterplot(data=d,x="Diameter",y="Height")
```

[22]: <AxesSubplot:xlabel='Diameter', ylabel='Height'>



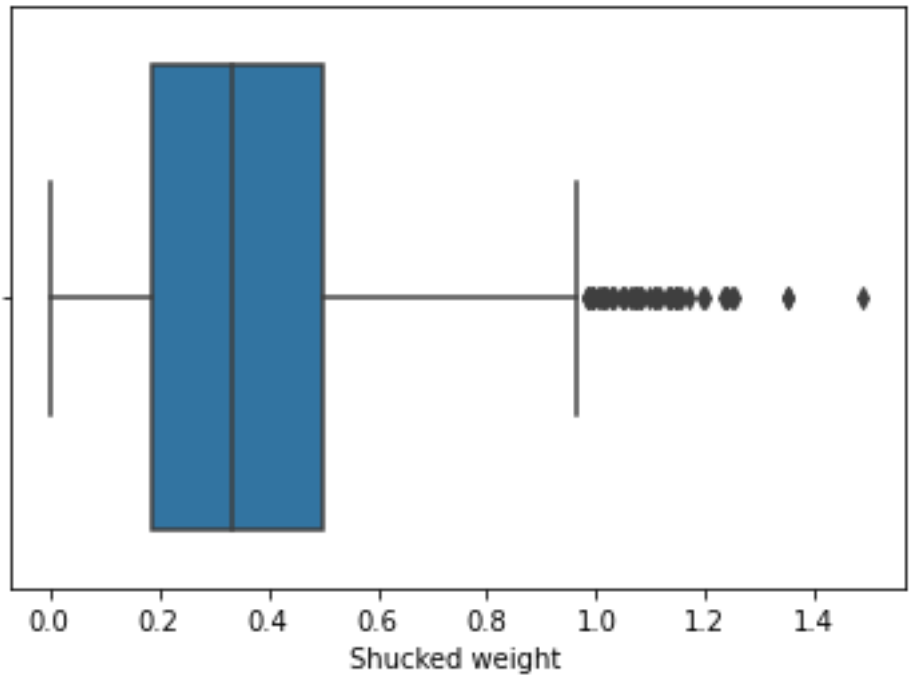
[23]:
```
sns.boxplot(data=d,x="Whole weight")
```

[23]: <AxesSubplot:xlabel='Whole weight'>



[24]:
```
sns.boxplot(data=d,x="Shucked weight")
```

[24]:
```
<AxesSubplot:xlabel='Shucked weight'>
```

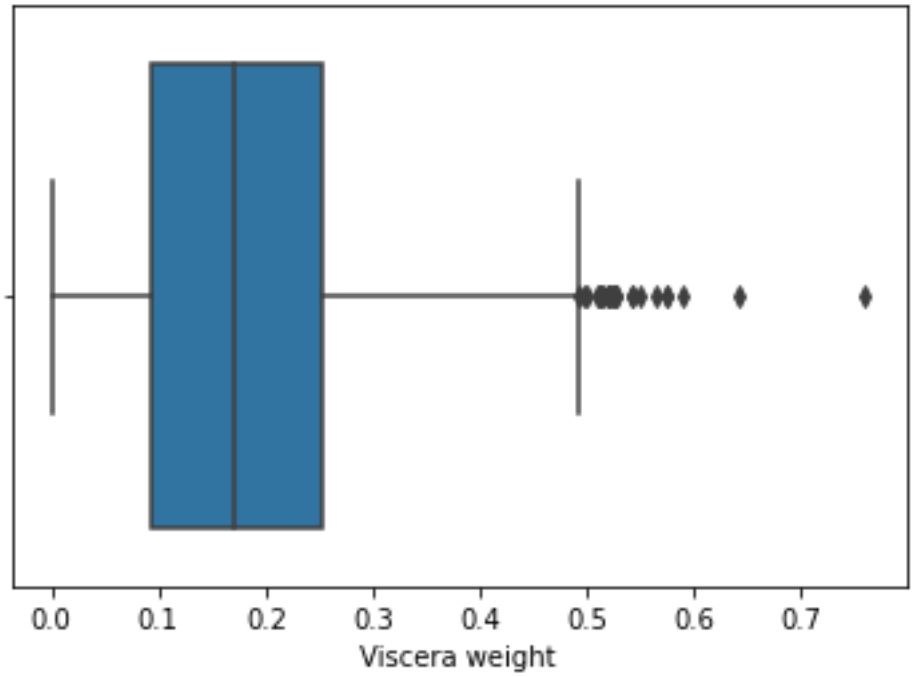


[25]:
```
d.columns
```

[25]:
```
Index(['Sex', 'Length', 'Diameter', 'Height', 'Whole weight',
'Shucked weight',
       'Viscera weight', 'Shell weight', 'Rings'],
      dtype='object')
```

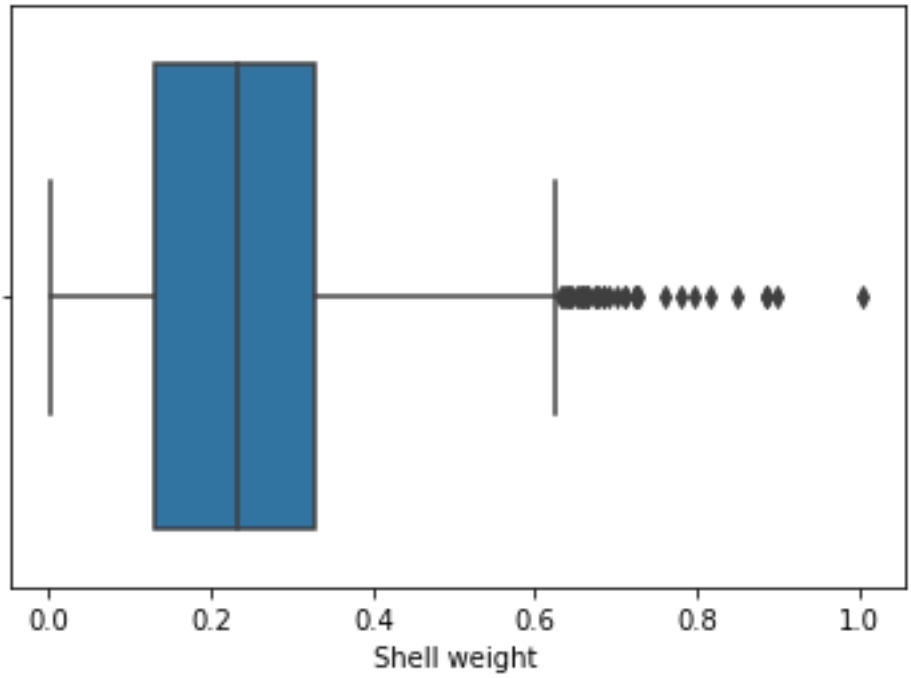
[27]:
```
sns.boxplot(data=d,x="Viscera weight")
```

[27]:
```
<AxesSubplot:xlabel='Viscera weight'>
```



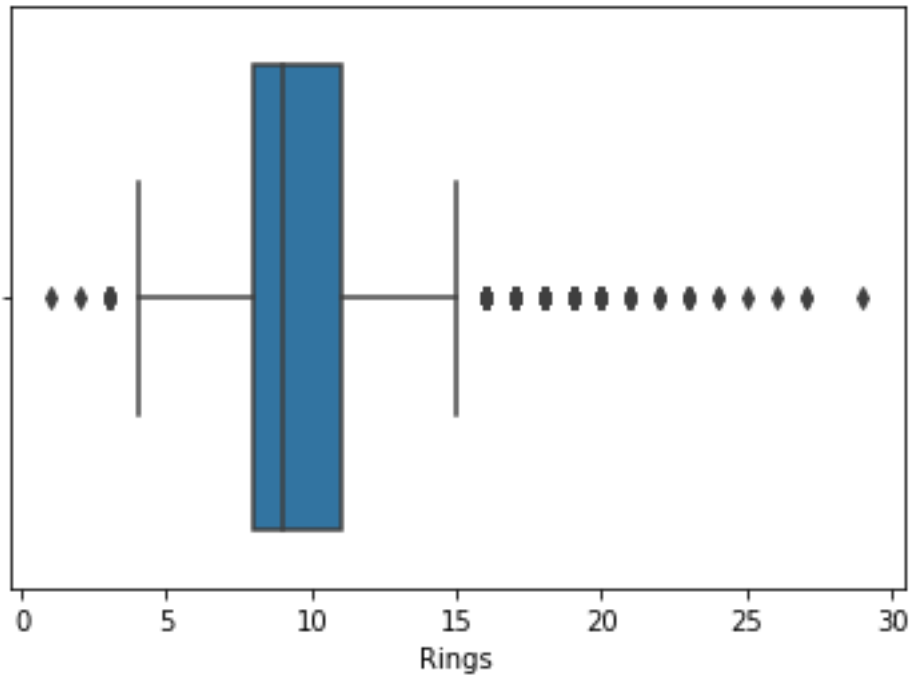
[28]:
```
sns.boxplot(data=d,x="Shell weight")
```

[28]:
```
<AxesSubplot:xlabel='Shell weight'>
```



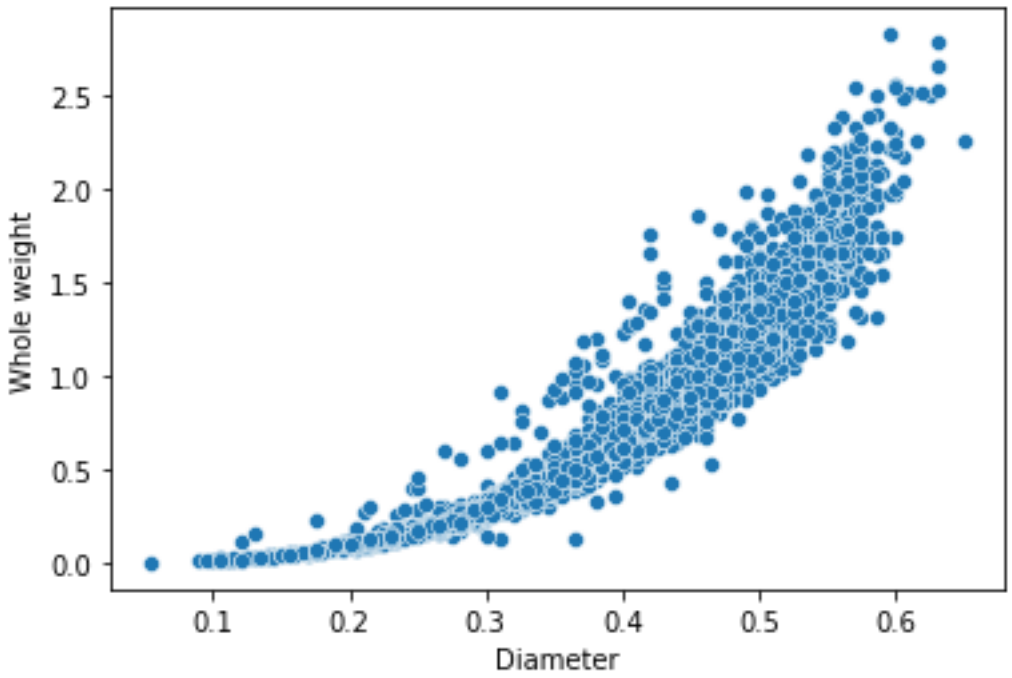
[29]: `sns.boxplot(data=d,x="Rings")`

[29]: `<AxesSubplot:xlabel='Rings'>`



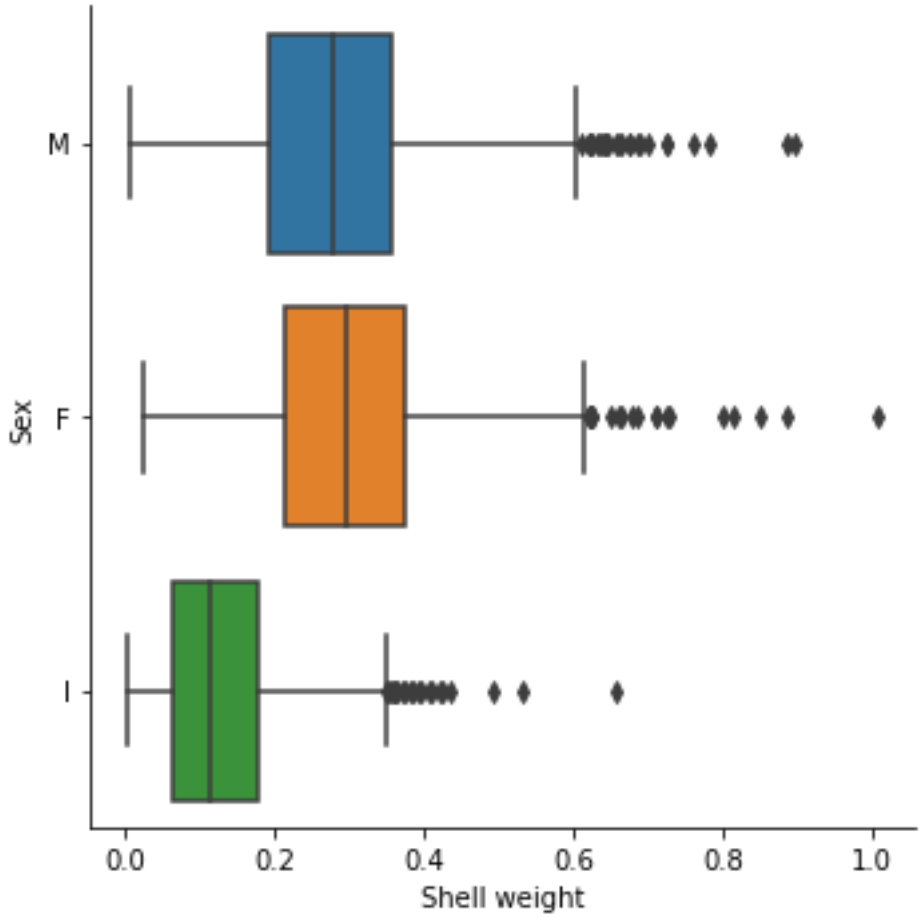
[31]:
```
sns.scatterplot(data=d,x="Diameter",y="Whole weight")
```

[31]:
```
<AxesSubplot:xlabel='Diameter', ylabel='Whole weight'>
```



[33]:
```
sns.catplot(x="Shell weight",y="Sex",data=d,kind='box')
```

[33]:
```
<seaborn.axisgrid.FacetGrid at 0x1ca496c8970>
```



2 Removing Outliners

[35]:
```
data1=d[~(d["Height"]>0.4)]
```

[36]:
```
data1=data1[~(data1["Length"]<0.15)]
```

[37]:
```
data1=data1[~(data1["Shell weight"]>0.8)]
```

[38]:
```
data1=data1[~(data1["Whole weight"]>2.5)]
```

[40]:
```
data1=data1[~(data1["Shucked weight"]>1.2)]
```

[42]:
```
data1.shape,d.shape
```

[42]:
```
((4148, 9), (4177, 9))
```

[43]:
```
data1["Age"]=data1["Rings"]+1.5
```

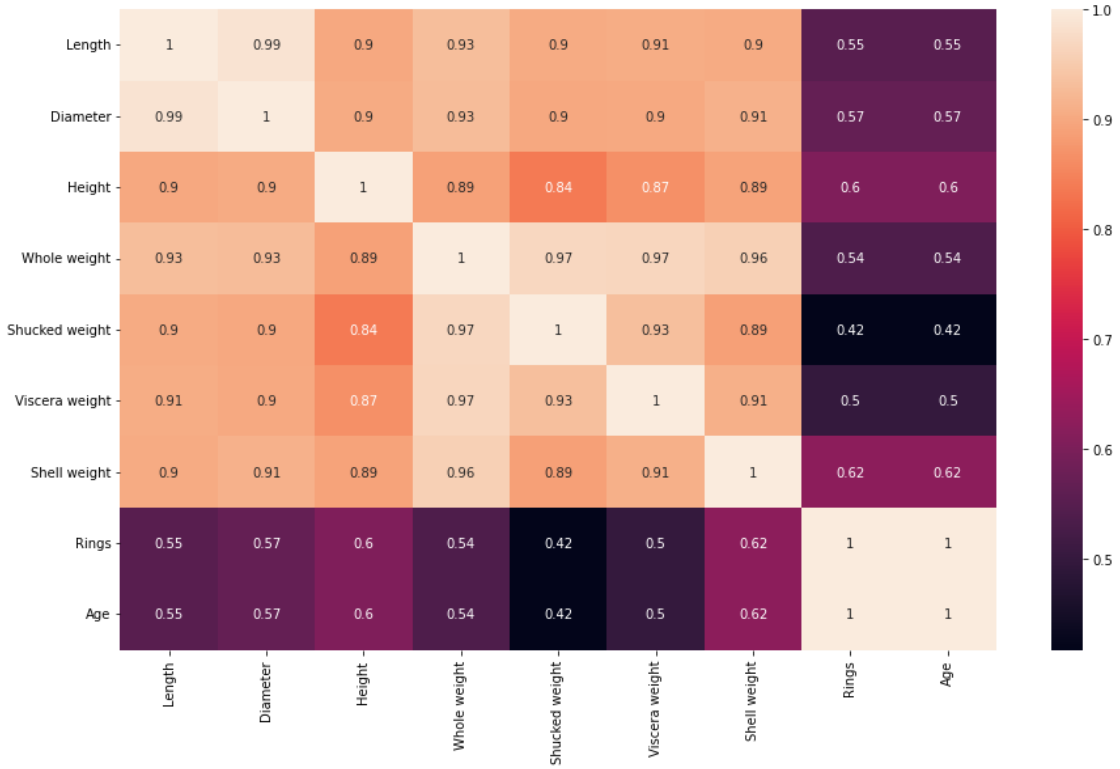
[44]:
```
data1.head()
```

[44]:

	Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings	Age
0	M	0.455	0.365	0.095	0.5140	0.2245	0.1010	0.150	15	16.5
1	M	0.350	0.265	0.090	0.2255	0.0995	0.0485	0.070	7	8.5
2	F	0.530	0.420	0.135	0.6770	0.2565	0.1415	0.210	9	10.5
3	M	0.440	0.365	0.125	0.5160	0.2155	0.1140	0.155	10	11.5
4	I	0.330	0.255	0.080	0.2050	0.0895	0.0395	0.055	7	8.5

[45]:
```
plt.figure(figsize=(15,9))
sns.heatmap(data1.corr(),annot=True)
```

[45]: <AxesSubplot:>



[46]:
```
q1=data1["Height"].quantile(0.25)
q3=data1["Height"].quantile(0.75)
iq=q3-q1
data2=data1[~((data1["Height"]<(q1-1.5*iq))|(data1["Height"]>(q3+1.5*iq)))]
```

[47]:
```
q1=data2["Length"].quantile(0.25)
q3=data2["Length"].quantile(0.75)
iq=q3-q1
data2=data2[~((data2["Length"]<(q1-1.5*iq))|(data2["Length"]>(q3+1.5*iq)))]
```

[48]:
```
q1=data2["Whole weight"].quantile(0.25)
q3=data2["Whole weight"].quantile(0.75)
iq=q3-q1
data2=data2[~((data2["Whole weight"]<(q1-1.5*iq))|(data2["Whole weight"]>(q3+1.
↪5*iq)))]
data2.shape
```

[48]: (4084, 10)

3 Split the data into dependent and independent variables.Check for Categorical columns and perform encoding

[49]:
```
x=data1.drop(columns=["Age","Rings"])
x["Sex"].replace({'M':2,'F':1,'I':0},inplace=True)
y=data1["Age"]
```

4 Scale the independent

variables

[50]:
```
from sklearn.preprocessing import StandardScaler
sc=StandardScaler()
x1=sc.fit_transform(x)
x1
```

[50]:
```
array([[ 1.15517188, -0.57962568, -0.43426571, …, -
        0.61179664, -0.72983642, -0.64298618],
       [ 1.15517188, -1.46650489, -1.4556039 , …, -
        1.19199725, -1.21854392, -1.23398399],
       [-0.05270635, 0.05385947, 0.12747029, …, -
       0.46326529,
        -0.35283349, -0.19973781],
       …,
       [ 1.15517188, 0.64511228, 0.6892063 , …, 0.78532642,
         1.00623881, 0.52423451],
       [-0.05270635, 0.856274 , 0.79134012, …, 0.81085524,
         0.75955788, 0.43558484],
  [ 1.15517188, 1.57422383, 1.50627685, …, 2.73480045,
        1.83471439, 1.90569191]])
```

5 Model Building

6 Linear Regression

[51]:
```
from sklearn.model_selection import train_test_split
from sklearn import metrics
x_train,x_test,y_train,y_test=train_test_split(x1,y,tes
t_size=0.
 ↪2,random_state=42)
x_train.shape,x_test.shape
```

[51]:
```
((3318, 8), (830, 8))
```

[52]:
```
from sklearn.linear_model import LinearRegression
lr=LinearRegression()
lr.fit(x_train,y_train)
lr.score(x_test,y_test)
```

[52]:
```
0.5676481741929682
```

7 Lasso

[53]:
```
from sklearn.linear_model import Lasso
lr1=Lasso(alpha=0.001)
lr1.fit(x_train,y_train)
lr1.score(x_test,y_test)
```

[53]:
```
0.5672651558727646
```

8 Ridge

[54]:
```
from sklearn.linear_model import Ridge
r1=Ridge(alpha=0.01)
r1.fit(x_train,y_train)
r1.score(x_test,y_test)
```

[54]:
```
0.5676440857767044
```

9 Prediction

[55]:
```
x_test[231],y_test[231]
```

[55]:
```
(array([1.15517188, 0.56064759, 0.94454085, 0.28941484,
0.66861919,
        0.59734142, 0.79679274, 0.797571 ]),
 15.5)
```

[56]:
```
x_test[23],y_test[23]
```

[56]:
```
(array([1.15517188, 0.89850634, 1.09774158, 0.68448704,
1.10789396,
        0.61126624, 1.57872474, 1.57325563]),
 10.5)
```

[57]:
```
lr.predict([x_test[231]])
```

[57]:
```
array([13.06004481])
```

[58]:
```
lr.predict([x_test[23]])
```

```
[58]: array([15.2756354])
```