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PROJECT : RETAIL STORE STOCK INVENTORY ANALYTICS

ASSIGNMENT: 04

1.DOWNLOADING DATASET

Dataset Link : Abalone

2. LOADING THE DATASET

In [ ]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
```

In [ ]:

```
df = pd.read_csv('/content/drive/MyDrive/abalone.csv')
```

In [ ]:

```
df.head()
```

Out[ ]:

	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.PERFORMING VISUALIZATION'S

(i)Univariate Analysis

(ii)Bi-Variate Analysis

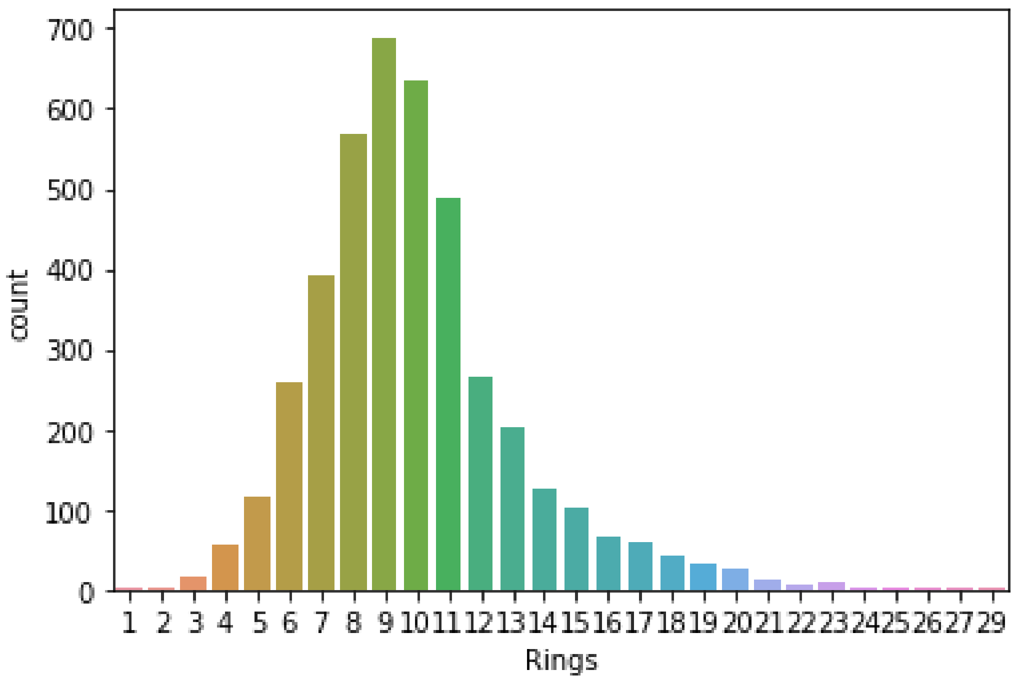
(iii)Multi-Variate Analysis

(i) UNIVARIATE

In [ ]:

```
# countplot
sns.countplot(data=df,x="Rings")
```

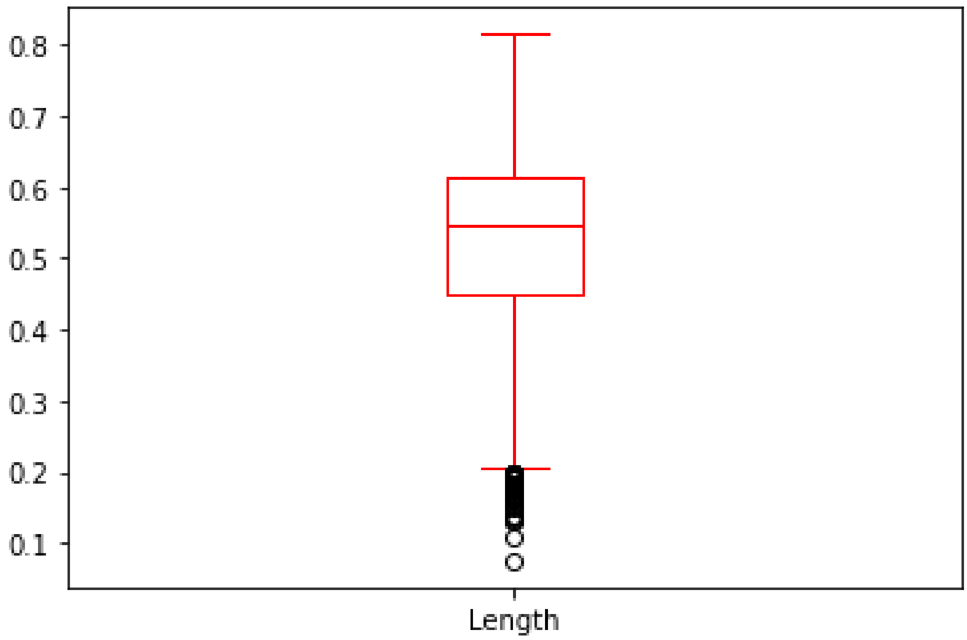
Out[ ]:



In [ ]:

```
#boxplot
df.boxplot(column=['Length'], grid=False, color='Red')
```

Out[ ]:

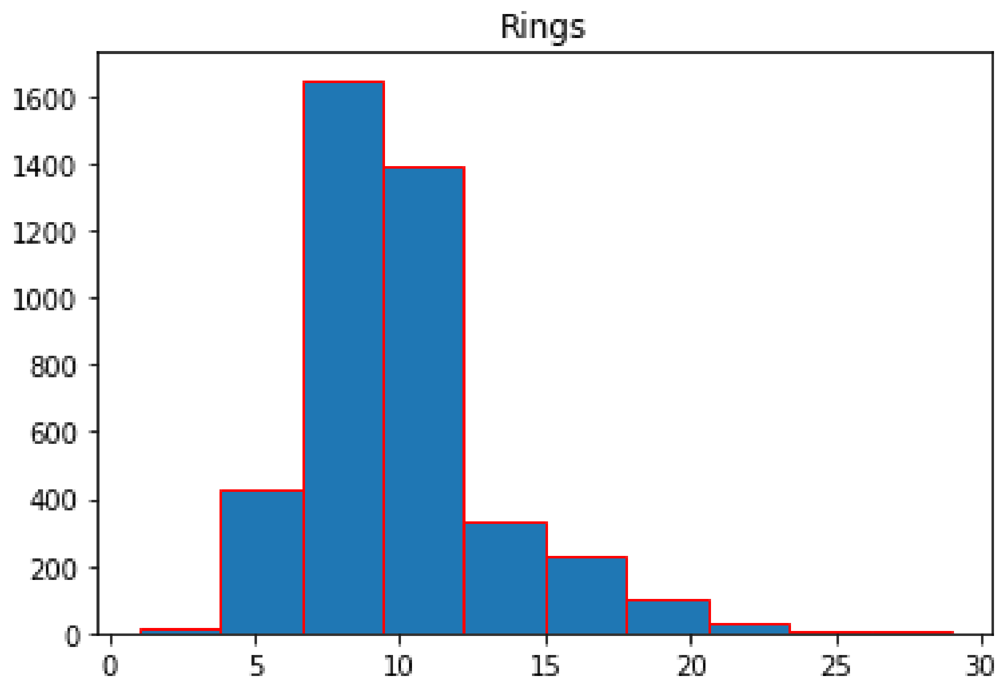


In [ ]:

```
#histogram
df.hist(column='Rings', grid=False, edgecolor='Red')
```

Out[ ]:

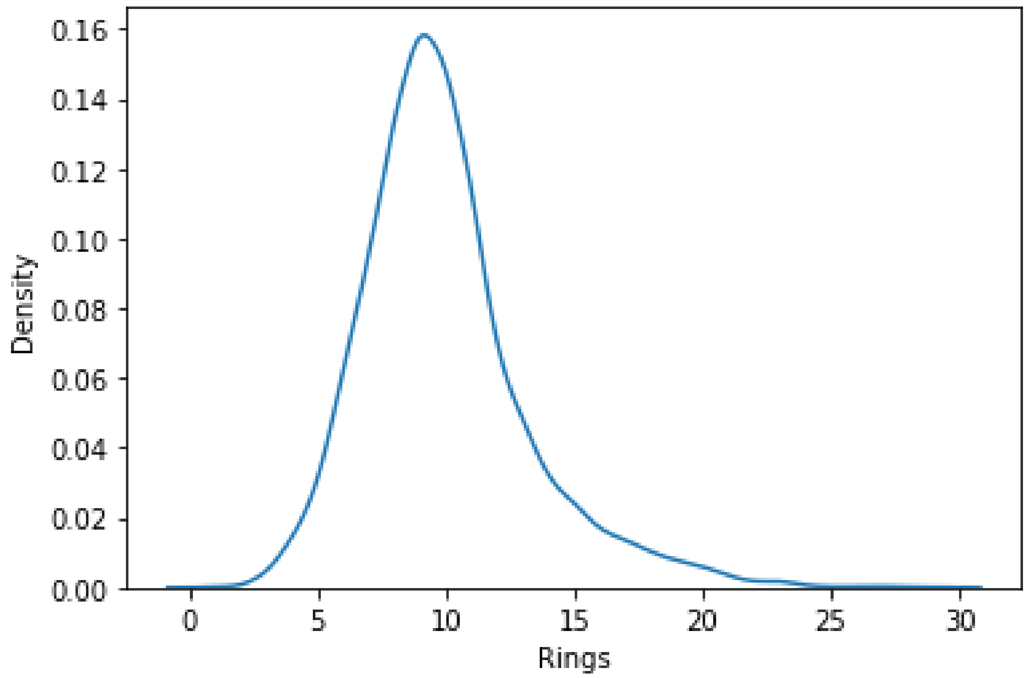
```
array([[]],
      dtype=object)
```



In [ ]:

```
#kdeplot
sns.kdeplot(df['Rings'])
```

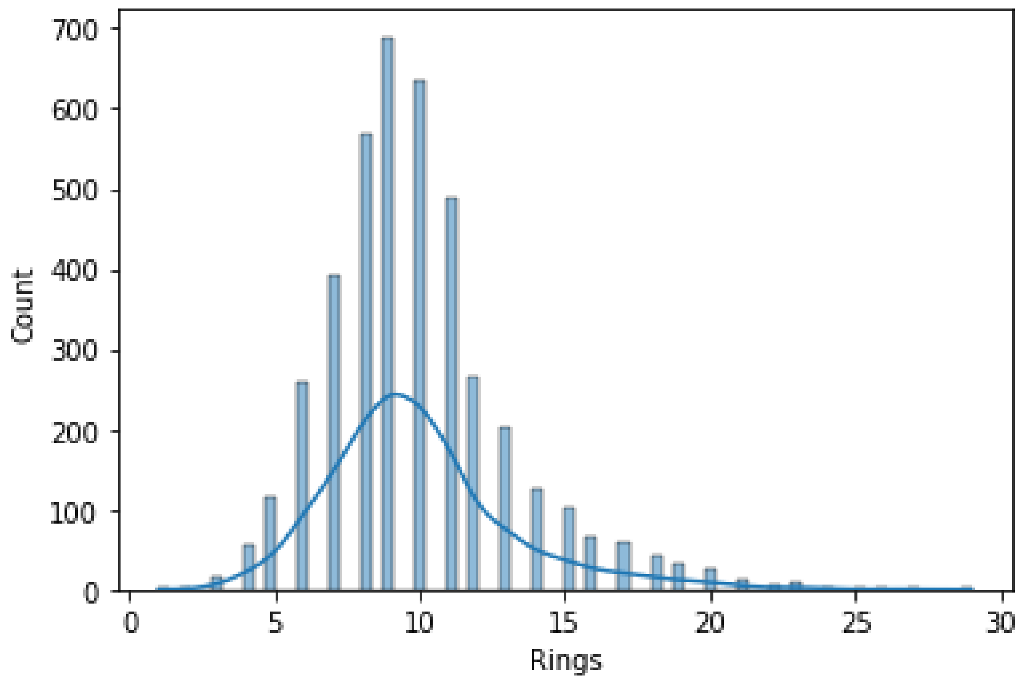
Out[ ]:



In [ ]:

```
#histplot
sns.histplot(df.Rings,kde=True)
```

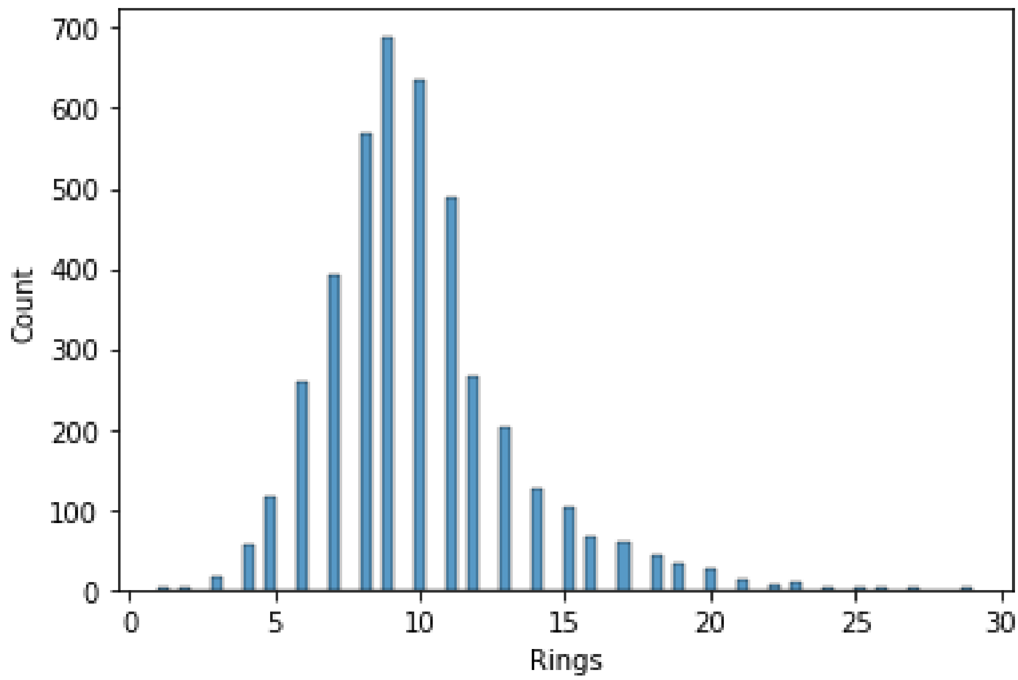
Out[ ]:



In [ ]:

```
#histplot
sns.histplot(df['Rings'])
```

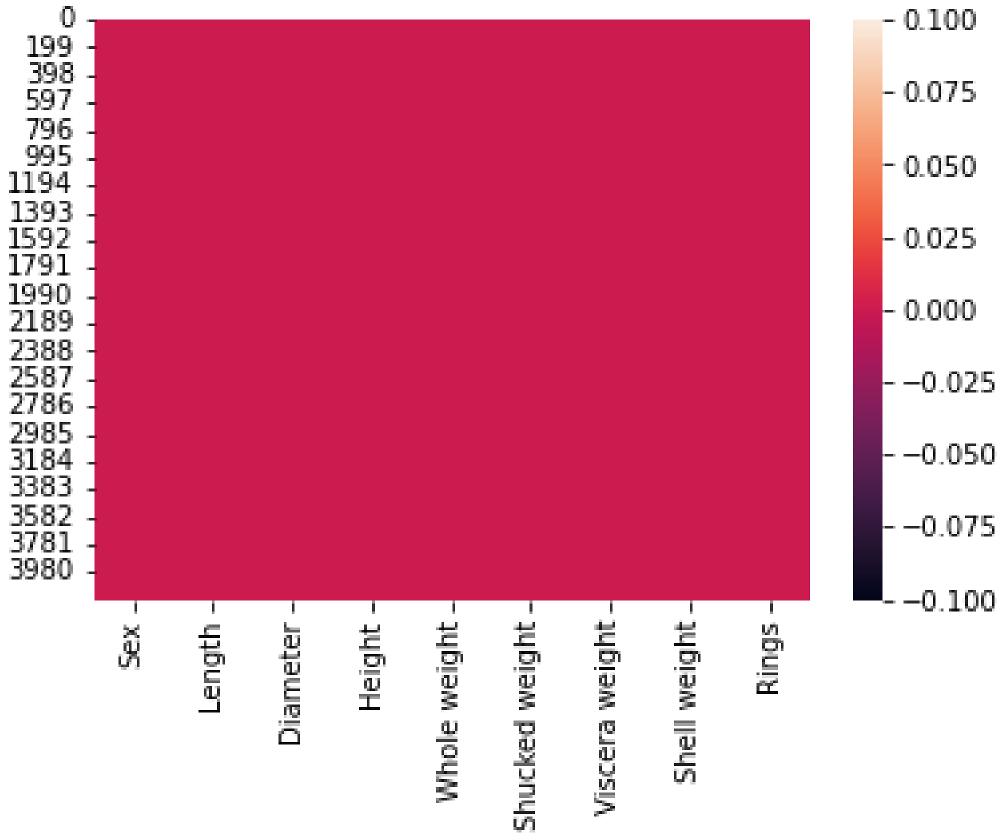
Out[ ]:



In [ ]:

```
#heatmap
sns.heatmap(df.isnull())
```

Out[ ]:

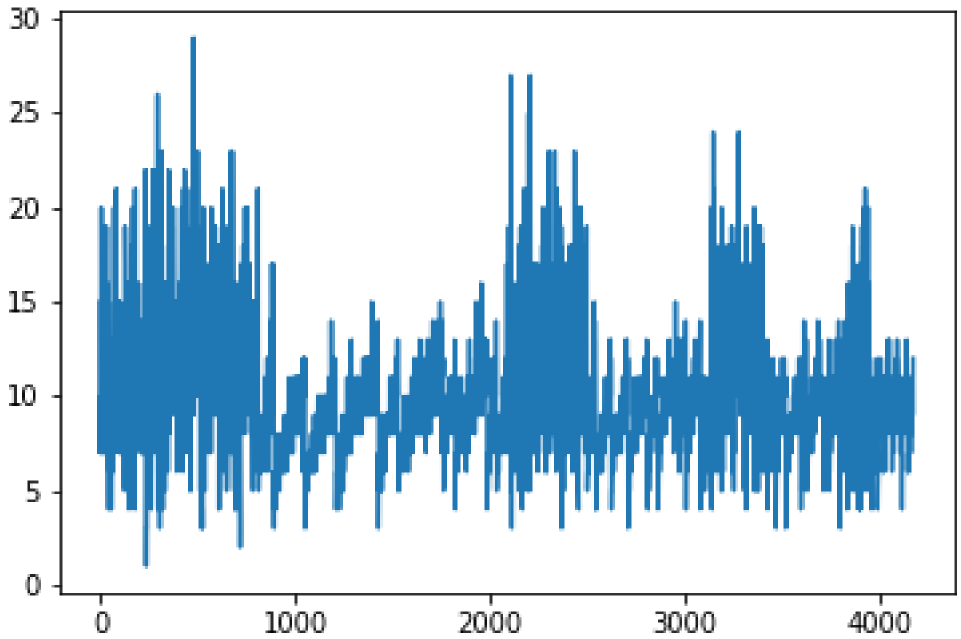


In [ ]:

```
#line plot
plt.plot(df['Rings'])
```

Out[ ]:

```
[]
```

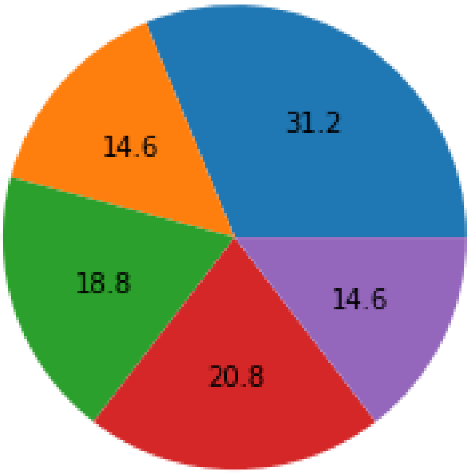


In [ ]:

```
#piechart
plt.pie(df['Rings'].head(),autopct='%.1f')
```

Out[ ]:

```
([,
  ,
  ,
  ,
  ],
 [Text(0.6111272563215626, 0.9146165735327998, ''),
  Text(-0.8270237769092663, 0.725280409515335, ''),
  Text(-1.041623153479572, -0.35358337932554523, ''),
  Text(-5.149471704824549e-08, -1.0999999999999988, ''),
  Text(0.9865599777267362, -0.4865176362145796, '')],
 [Text(0.33334213981176136, 0.4988817673815271, '31.2'),
  Text(-0.4511038783141452, 0.39560749609927365, '14.6'),
  Text(-0.5681580837161301, -0.1928636614502974, '18.8'),
  Text(-2.8088027480861175e-08, -0.5999999999999993, '20.8'),
  Text(0.5381236242145833, -0.2653732561170434, '14.6')])
```

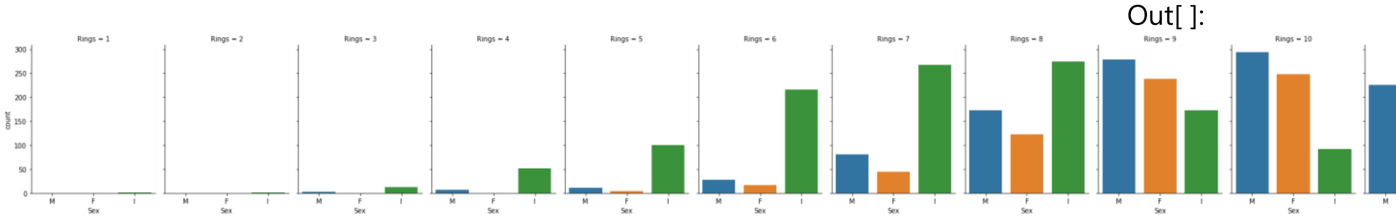


(ii) BIVARIATE

In [ ]:

```
#countplot
sns.catplot(x="Sex",col="Rings",data=df, kind="count",height=4, aspect=.7)
```

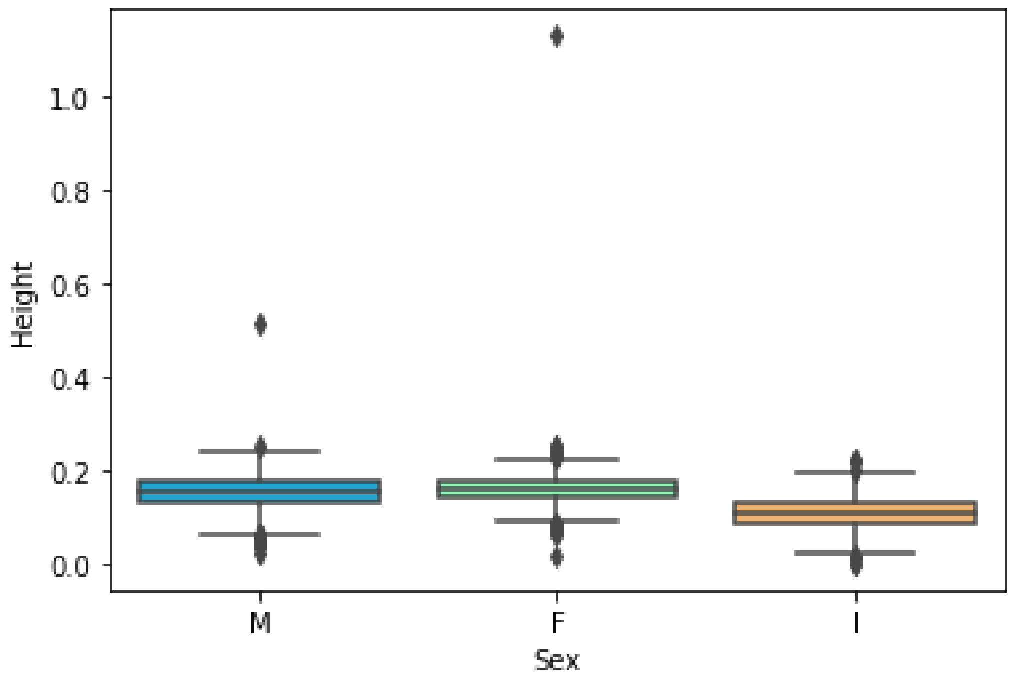
Out[ ]:



In [ ]:

```
#boxplot
sns.boxplot(x='Sex',y='Height',data=df,palette='rainbow')
```

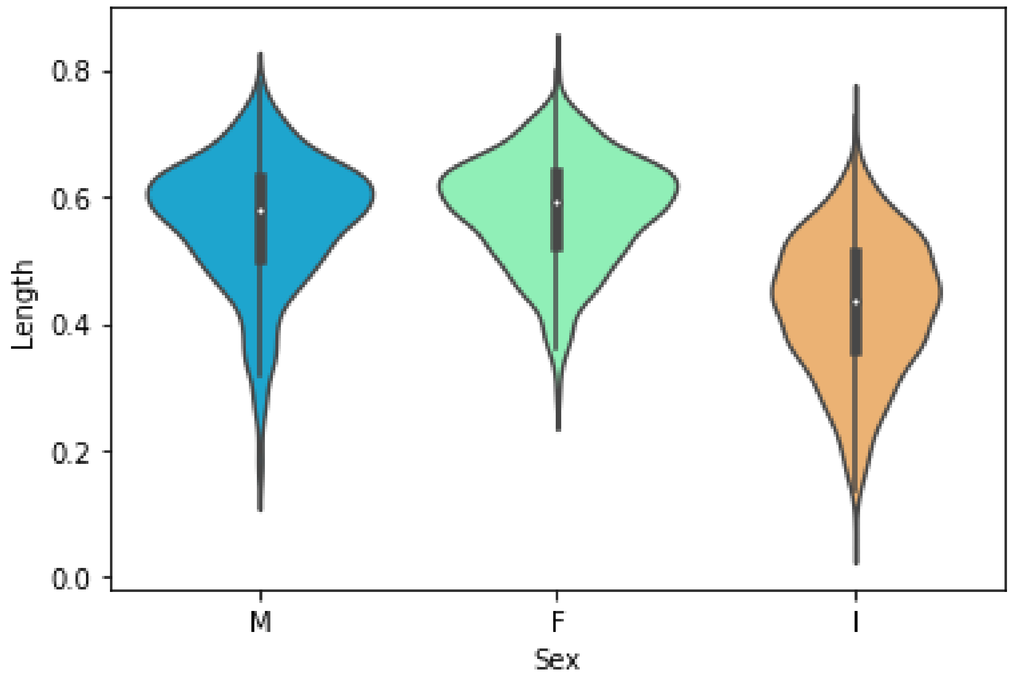
Out[ ]:



In [ ]:

```
#violin plot
sns.violinplot(x="Sex", y="Length", data=df,palette='rainbow')
```

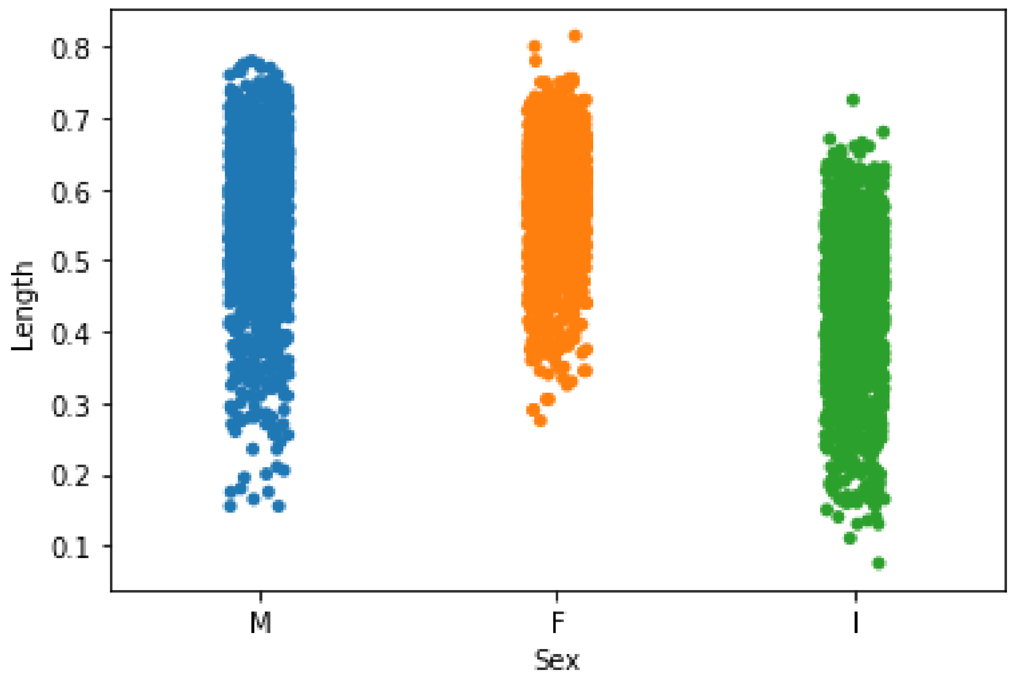
Out[ ]:



In [ ]:

```
#strip plot
sns.stripplot(x="Sex", y="Length", data=df)
```

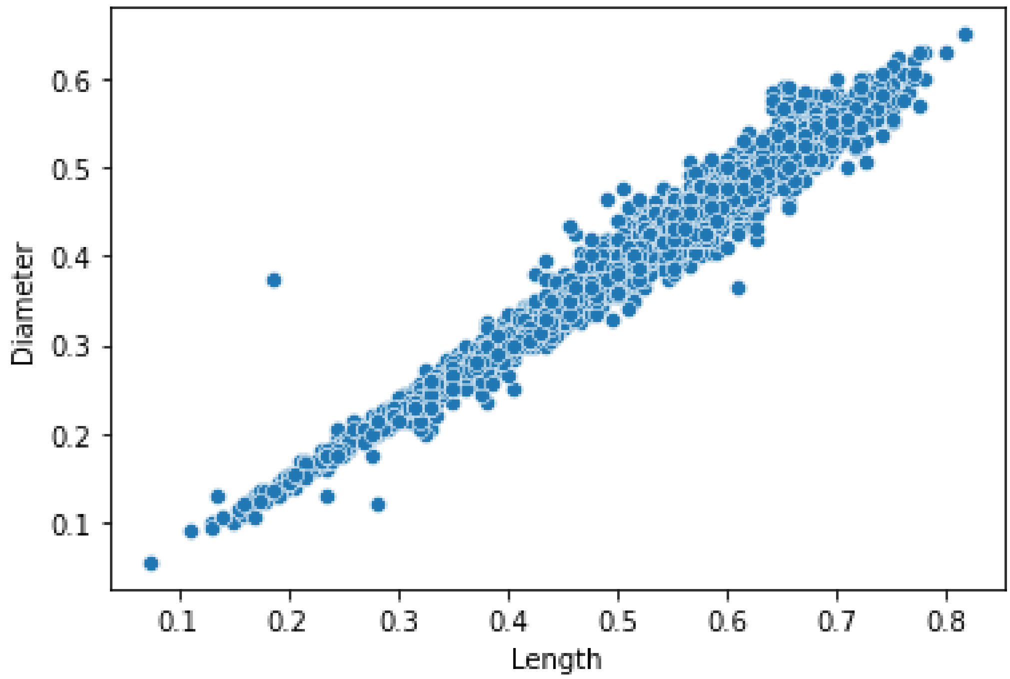
Out[ ]:



In [ ]:

```
#scatter plot
sns.scatterplot(x = df["Length"],y = df["Diameter"])
```

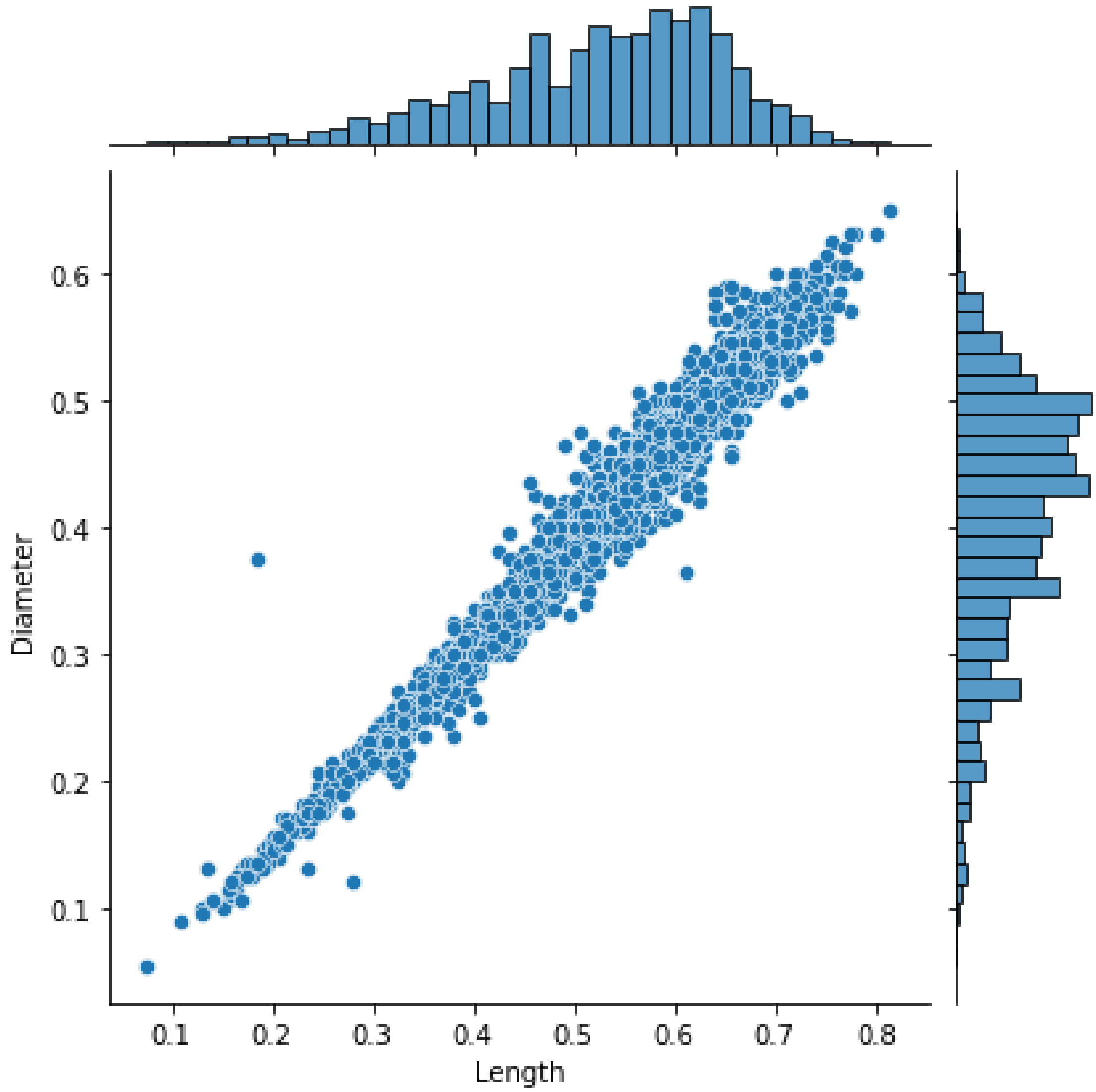
Out[ ]:



In [ ]:

```
#joint_plot
sns.jointplot(x="Length",y="Diameter",data=df)
```

Out[ ]:



(III) MULTI-VARIATE

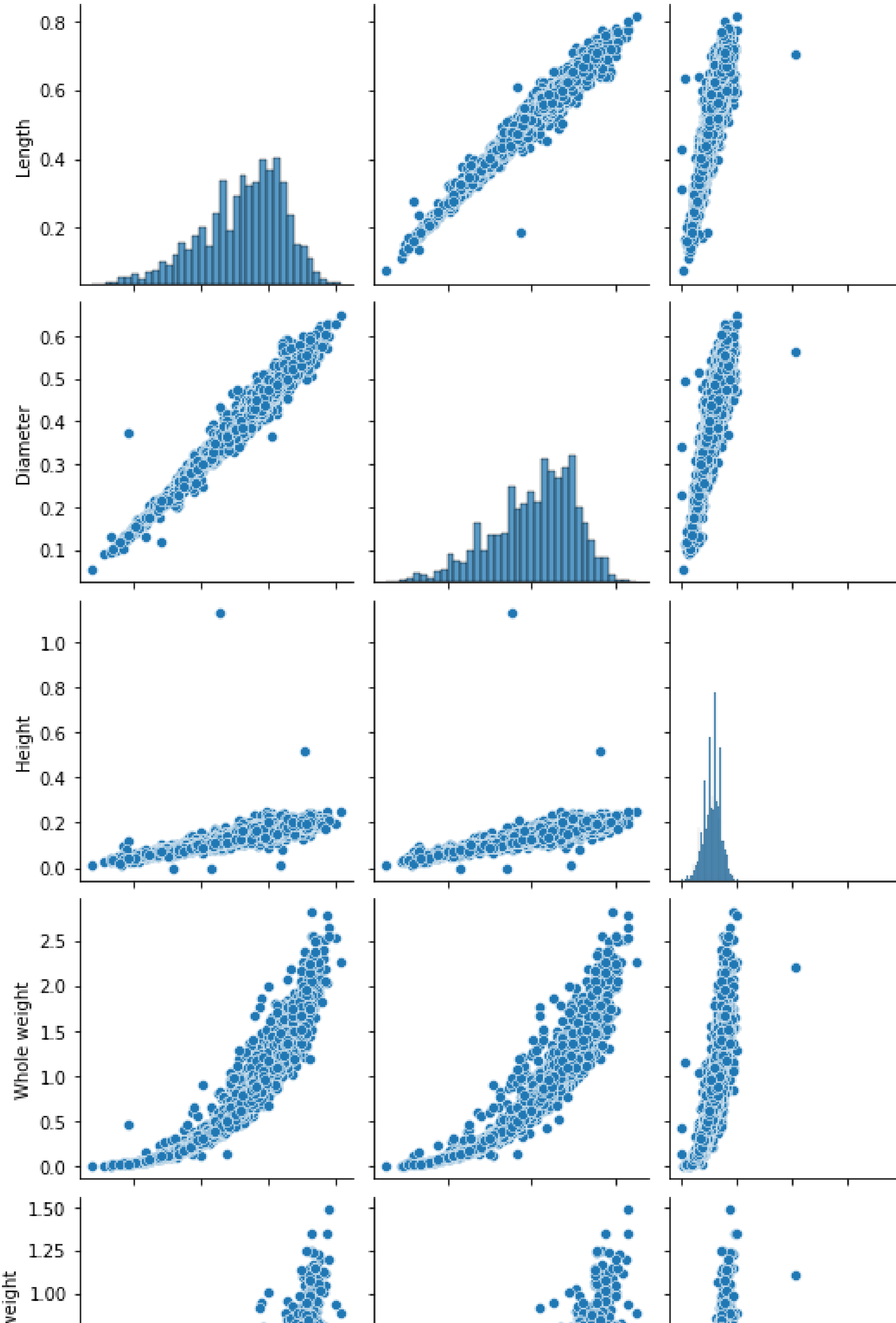
In [ ]:

```
#Boxplot
fig, ax1 = plt.subplots(figsize=(8,5))
testPlot = sns.boxplot(ax=ax1, x='Length', y='Diameter', hue='Sex',
data=df)
```

In [ ]:

```
sns.pairplot(df)
```

Out[ ]:

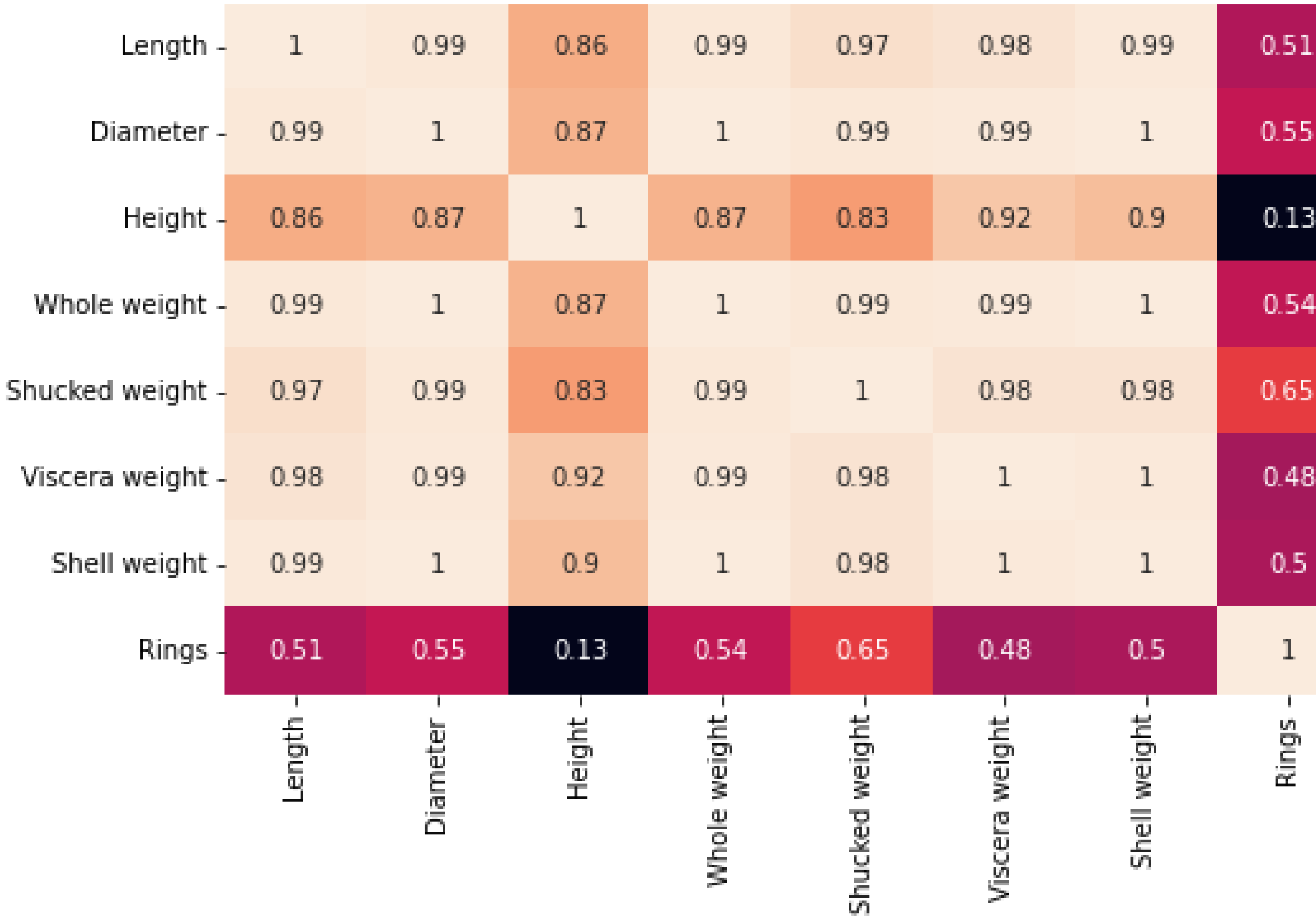


Length
0.8
0.6
0.4
0.2
Diameter
0.6
0.5
0.4
0.3
0.2
0.1
Height
1.0
0.8
0.6
0.4
0.2
0.0
Whole weight
2.5
2.0
1.5
1.0
0.5
0.0
weight
1.50
1.25
1.00

In [ ]:

```
fig=plt.figure(figsize=(10,5))
sns.heatmap(df.head().corr(),annot=True)
```

Out[ ]:



4. Perform descriptive statistics on the dataset

In [ ]:

```
df
```

Out[ ]:

	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

	Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings
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

In [ ]:

```
df.head()
```

Out[ ]:

	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

In [ ]:

```
df.info()
```

```
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
```

In [ ]:

```
df.describe()
```

Out[ ]:

	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings
count	4177.000000	4177.000000	4177.000000	4177.000000	4177.000000	4177.000000	4177.000000	4177.000000
mean	0.523992	0.407881	0.139516	0.828742	0.359367	0.180594	0.238831	9.933684
std	0.120093	0.099240	0.041827	0.490389	0.221963	0.109614	0.139203	3.224169
min	0.075000	0.055000	0.000000	0.002000	0.001000	0.000500	0.001500	1.000000
25%	0.450000	0.350000	0.115000	0.441500	0.186000	0.093500	0.130000	8.000000
50%	0.545000	0.425000	0.140000	0.799500	0.336000	0.171000	0.234000	9.000000
75%	0.615000	0.480000	0.165000	1.153000	0.502000	0.253000	0.329000	11.000000
max	0.815000	0.650000	1.130000	2.825500	1.488000	0.760000	1.005000	29.000000

In [ ]:

```
numerical_features = df.select_dtypes(include = [np.number]).columns
categorical_features = df.select_dtypes(include = [object]).columns
```

In [ ]:

```
df[numerical_features].mean()
```

Out[ ]:

```
Length            0.523992
Diameter          0.407881
Height            0.139516
Whole weight      0.828742
Shucked weight    0.359367
Viscera weight    0.180594
Shell weight      0.238831
Rings             9.933684
dtype: float64
```

In [ ]:

```
df[numerical_features].median()
```

Out[ ]:

```
Length            0.5450
Diameter          0.4250
Height            0.1400
Whole weight      0.7995
Shucked weight    0.3360
Viscera weight    0.1710
Shell weight      0.2340
Rings             9.0000
dtype: float64
```

In [ ]:

```
percentage = [df[numerical_features].quantile(0),
             df[numerical_features].quantile(0.25),
             df[numerical_features].quantile(0.50),
             df[numerical_features].quantile(0.75),
             df[numerical_features].quantile(1)]
percentage
```

Out[ ]:

```
[Length            0.0750
 Diameter          0.0550
 Height            0.0000
 Whole weight      0.0020
 Shucked weight    0.0010
 Viscera weight    0.0005
 Shell weight      0.0015
 Rings             1.0000
 Name: 0.0, dtype: float64, Length            0.4500
 Diameter          0.3500
 Height            0.1150
 Whole weight      0.4415
 Shucked weight    0.1860
 Viscera weight    0.0935
 Shell weight      0.1300
 Rings             8.0000
 Name: 0.25, dtype: float64, Length            0.5450
 Diameter          0.4250
 Height            0.1400
 Whole weight      0.7995
 Shucked weight    0.3360
 Viscera weight    0.1710
 Shell weight      0.2340
 Rings             9.0000
 Name: 0.5, dtype: float64, Length             0.615
 Diameter           0.480
 Height             0.165
 Whole weight       1.153
 Shucked weight     0.502
 Viscera weight     0.253
 Shell weight       0.329
 Rings             11.000
 Name: 0.75, dtype: float64, Length             0.8150
 Diameter           0.6500
 Height             1.1300
 Whole weight       2.8255
```

```
 Shucked weight     1.4880
 Viscera weight     0.7600
 Shell weight       1.0050
 Rings             29.0000
 Name: 1.0, dtype: float64]
```

In [ ]:

```
df[numerical_features].value_counts()
```

Out[ ]:

```
Length  Diameter  Height  Whole weight  Shucked weight  Viscera weight  She
ll weight  Rings
0.075   0.055     0.010   0.0020        0.0010          0.0005          0.0
015        1        1
0.590   0.465     0.155   1.1360        0.5245          0.2615          0.2
750        11       1
                  0.165   1.1150        0.5165          0.2730          0.2
750        10       1
                  0.170   1.0425        0.4635          0.2400          0.2
700        10       1
                  0.195   1.0885        0.3685          0.1870          0.3
750        17       1

..
0.485   0.370     0.155   0.9680        0.4190          0.2455          0.2
365        9        1
        0.375     0.110   0.4640        0.2015          0.0900          0.1
490        8        1
                  0.125   0.5620        0.2505          0.1345          0.1
525        8        1
                  0.130   0.5535        0.2660          0.1120          0.1
570        8        1
0.815   0.650     0.250   2.2550        0.8905          0.4200          0.7
975        14       1
Length: 4177, dtype: int64
```

In [ ]:

```
df[numerical_features].mode()
```

Out[ ]:

	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings
0	0.550	0.45	0.15	0.2225	0.175	0.1715	0.275	9.0
1	0.625	NaN	NaN	NaN	NaN	NaN	NaN	NaN

In [ ]:

```
df[numerical_features].std()
```

Out[ ]:

```
Length            0.120093
Diameter          0.099240
Height            0.041827
Whole weight      0.490389
Shucked weight    0.221963
Viscera weight    0.109614
Shell weight      0.139203
```

```
Rings             3.224169
dtype: float64
```

In [ ]:

```
df[numerical_features].var()
```

Out[ ]:

```
Length             0.014422
Diameter           0.009849
Height             0.001750
Whole weight       0.240481
Shucked weight     0.049268
Viscera weight     0.012015
Shell weight       0.019377
Rings             10.395266
dtype: float64
```

In [ ]:

```
df[numerical_features].skew()
```

Out[ ]:

```
Length           -0.639873
Diameter         -0.609198
Height            3.128817
Whole weight      0.530959
Shucked weight    0.719098
Viscera weight    0.591852
Shell weight      0.620927
Rings             1.114102
dtype: float64
```

In [ ]:

```
df[numerical_features].kurt()
```

Out[ ]:

```
Length             0.064621
Diameter          -0.045476
Height            76.025509
Whole weight      -0.023644
Shucked weight     0.595124
Viscera weight     0.084012
Shell weight       0.531926
Rings              2.330687
dtype: float64
```

5. Check for Missing values and deal with them

In [ ]:

```
df.isnull()
```

Out[ ]:

	Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings
0	False	False	False	False	False	False	False	False	False
1	False	False	False	False	False	False	False	False	False

	Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings
2	False	False	False	False	False	False	False	False	False
3	False	False	False	False	False	False	False	False	False
4	False	False	False	False	False	False	False	False	False
...	...	...	...	...	...	...	...	...	...
4172	False	False	False	False	False	False	False	False	False
4173	False	False	False	False	False	False	False	False	False
4174	False	False	False	False	False	False	False	False	False
4175	False	False	False	False	False	False	False	False	False
4176	False	False	False	False	False	False	False	False	False

4177 rows × 9 columns

In [ ]:

```
df.isnull().any()
```

Out[ ]:

```
Sex               False
Length            False
Diameter          False
Height            False
Whole weight      False
Shucked weight    False
Viscera weight    False
Shell weight      False
Rings             False
dtype: bool
```

In [ ]:

```
df.isnull().sum()
```

Out[ ]:

```
Sex               0
Length            0
Diameter          0
Height            0
Whole weight      0
Shucked weight    0
Viscera weight    0
Shell weight      0
```

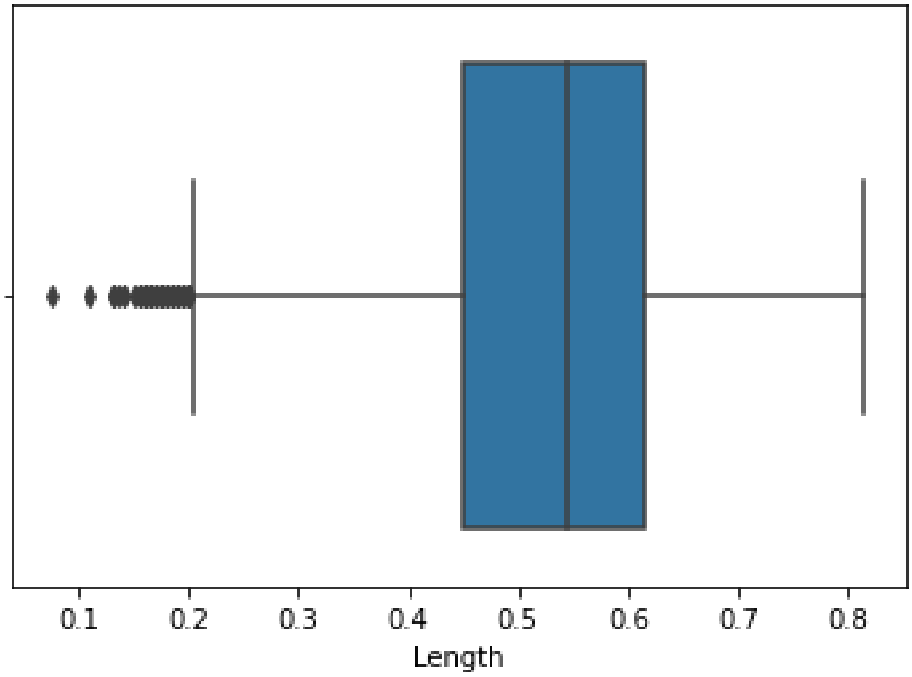
```
Rings             0
dtype: int64
```

6. Find the outliers and replace them outliers

In [ ]:

```
#length
sns.boxplot(x=df['Length'])
```

Out[ ]:



In [ ]:

```
q1 = df['Length'].quantile(0.25)
q2 = df['Length'].quantile(0.75)
iqr = q2-q1
q1, q2, iqr
```

Out[ ]:

```
(0.45, 0.615, 0.16499999999999998)
```

In [ ]:

```
upper_limit = q2 + (1.5 * iqr)
lower_limit = q1 - (1.5 * iqr)
lower_limit, upper_limit
```

Out[ ]:

```
(0.20250000000000004, 0.8624999999999999)
```

In [ ]:

```
new_df = df.loc[(df['Length'] <= upper_limit) & (df['Length'] >=
lower_limit)]
print('before removing outliers:', len(df))
print('after removing outliers:',len(new_df))
print('outliers:', len(df)-len(new_df))
```

```
before removing outliers: 4177
after removing outliers: 4128
outliers: 49
```

In [ ]:

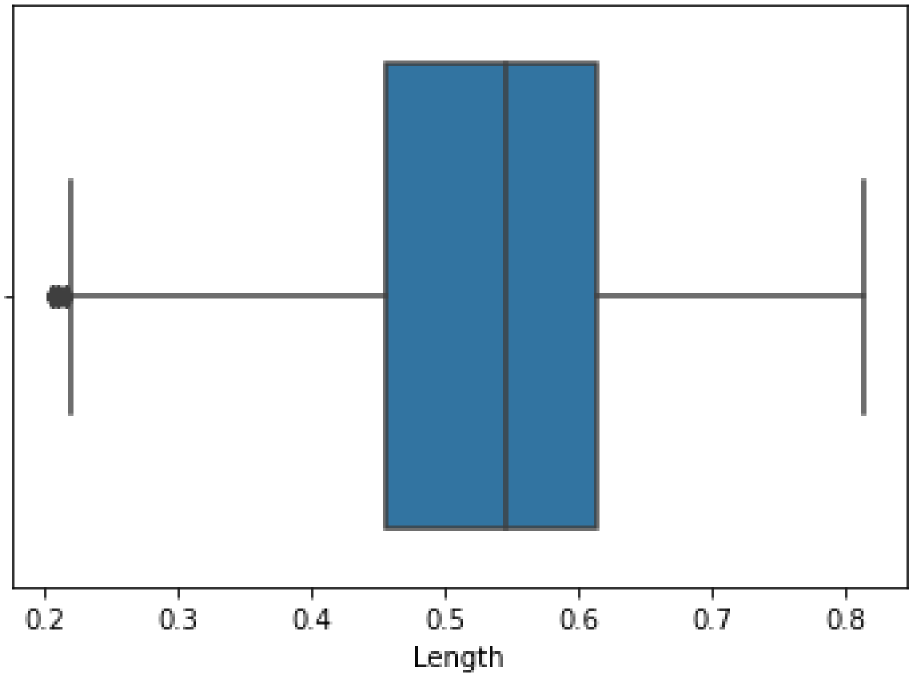
```
new_df = df.copy()
new_df.loc[(new_df['Length']>upper_limit), 'Length'] = upper_limit
```

```
new_df.loc[(new_df['Length']<lower_limit), 'Length'] = lower_limit
```

In [ ]:

```
sns.boxplot(x=new_df['Length'])
```

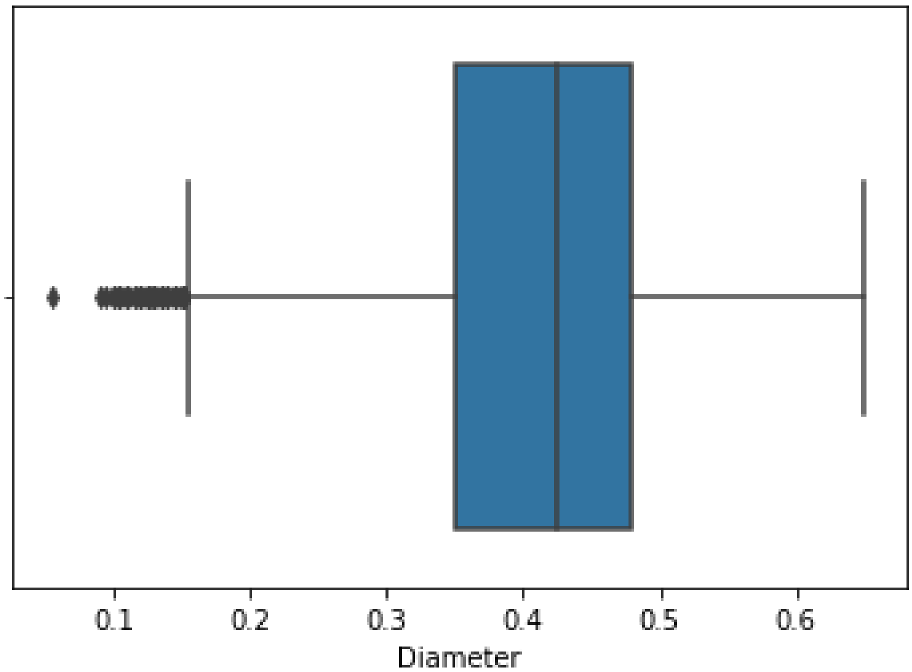
Out[ ]:



In [ ]:

```
#Diameter
sns.boxplot(x=df['Diameter'])
```

Out[ ]:



In [ ]:

```
q1 = df['Diameter'].quantile(0.25)
q2 = df['Diameter'].quantile(0.75)
iqr = q2-q1
```

```
q1, q2, iqr
```

Out[ ]:

```
(0.45, 0.615, 0.16499999999999998)
```

In [ ]:

```
upper_limit = q2 + (1.5 * iqr)
lower_limit = q1 - (1.5 * iqr)
lower_limit, upper_limit
```

Out[ ]:

```
(0.20250000000000004, 0.8624999999999999)
```

In [ ]:

```
new_df = df.loc[(df['Diameter'] <= upper_limit) & (df['Diameter'] >=
lower_limit)]
print('before removing outliers:', len(df))
print('after removing outliers:',len(new_df))
print('outliers:', len(df)-len(new_df))
```

```
before removing outliers: 4177
after removing outliers: 4027
outliers: 150
```

In [ ]:

```
new_df = df.copy()
new_df.loc[(new_df['Diameter']>upper_limit), 'Diameter'] = upper_limit
new_df.loc[(new_df['Diameter']<lower_limit), 'Diameter'] = lower_limit
```

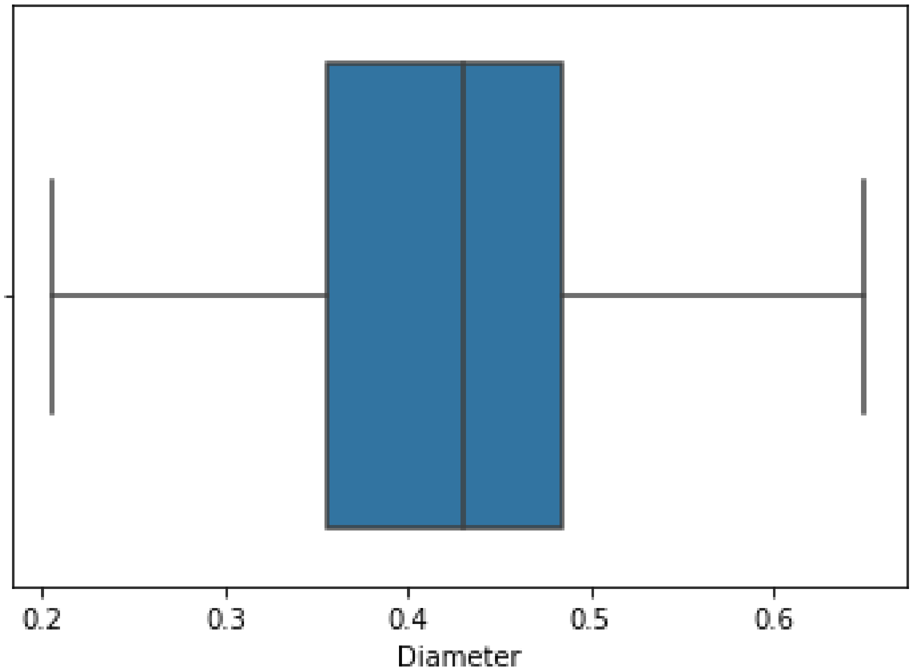
```
/usr/local/lib/python3.7/dist-packages/pandas/core/indexing.py:1817: Settin
gWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs
/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  self._setitem_single_column(loc, value, pi)
```

In [ ]:

```
sns.boxplot(x=new_df['Diameter'])
```

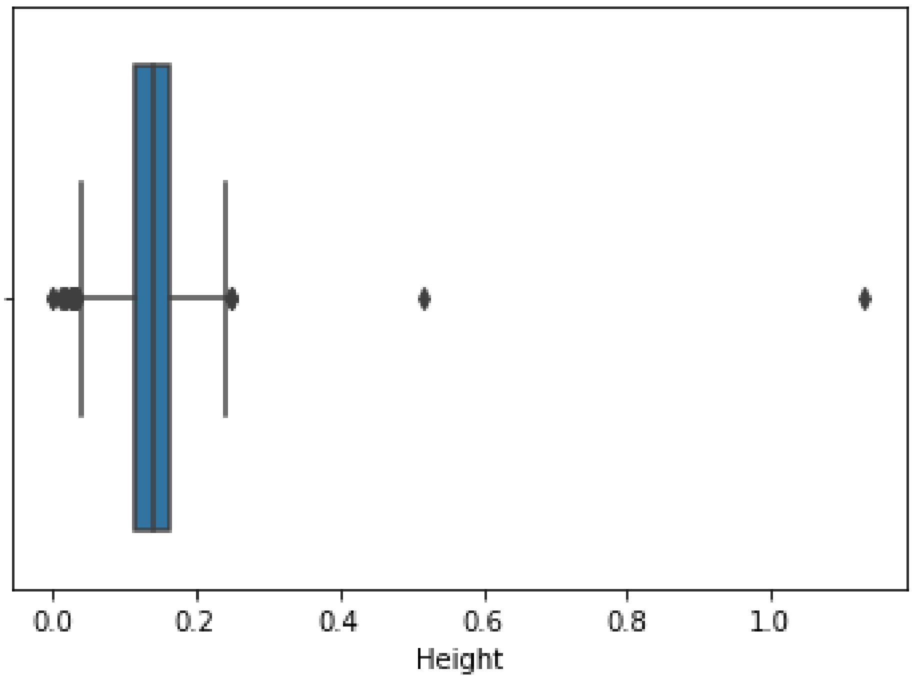
Out[ ]:



In [ ]:

```
#Height
sns.boxplot(x=df['Height'])
```

Out[ ]:



In [ ]:

```
q1 = df['Height'].quantile(0.25)
q2 = df['Height'].quantile(0.75)
iqr = q2-q1
q1, q2, iqr
```

Out[ ]:

```
(0.45, 0.615, 0.16499999999999998)
```

In [ ]:

```
upper_limit = q2 + (1.5 * iqr)
lower_limit = q1 - (1.5 * iqr)
lower_limit, upper_limit
```

Out[ ]:

```
(0.20250000000000004, 0.8624999999999999)
```

In [ ]:

```
new_df = df.loc[(df['Height'] <= upper_limit) & (df['Height'] >=
lower_limit)]
print('before removing outliers:', len(df))
print('after removing outliers:',len(new_df))
print('outliers:', len(df)-len(new_df))
```

```
before removing outliers: 4177
after removing outliers: 153
outliers: 4024
```

In [ ]:

```
new_df = df.copy()
new_df.loc[(new_df['Height']>upper_limit), 'Height'] = upper_limit
new_df.loc[(new_df['Height']<lower_limit), 'Height'] = lower_limit
```

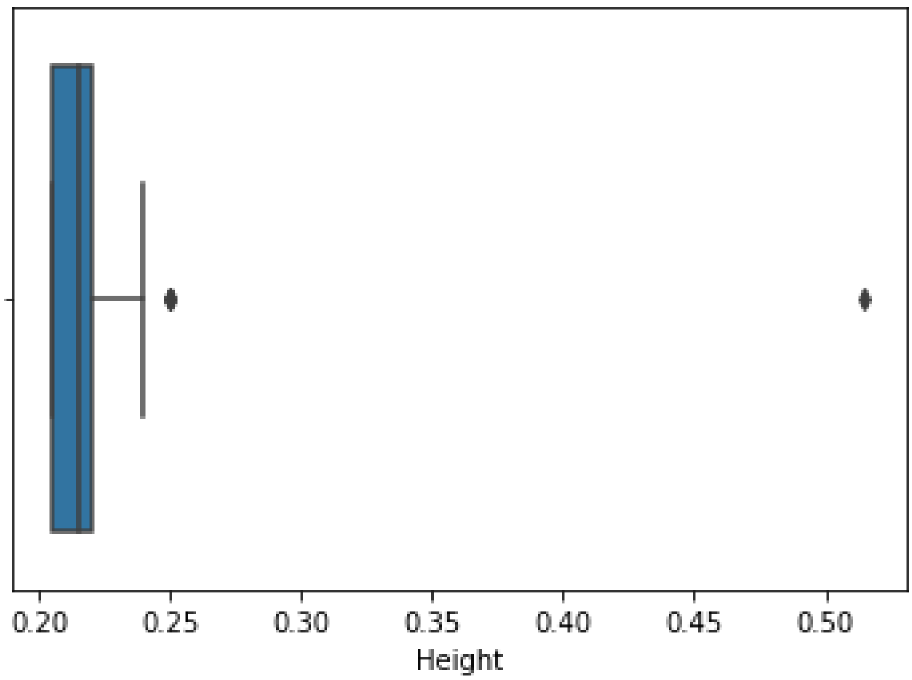
```
/usr/local/lib/python3.7/dist-packages/pandas/core/indexing.py:1817: Settin
gWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs
/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  self._setitem_single_column(loc, value, pi)
```

In [ ]:

```
sns.boxplot(x=new_df['Height'])
```

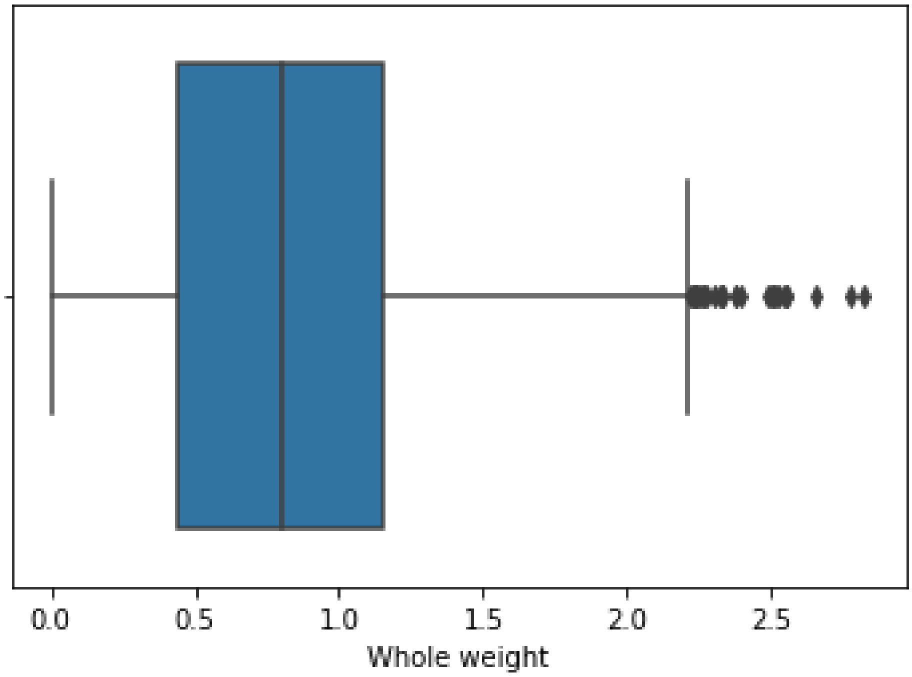
Out[ ]:



In [ ]:

```
#Whole Weight
sns.boxplot(x=df['Whole weight'])
```

Out[ ]:



In [ ]:

```
q1 = df['Whole weight'].quantile(0.25)
q2 = df['Whole weight'].quantile(0.75)
iqr = q2-q1
q1, q2, iqr
```

Out[ ]:

```
(0.45, 0.615, 0.16499999999999998)
```

In [ ]:

```
upper_limit = q2 + (1.5 * iqr)
lower_limit = q1 - (1.5 * iqr)
lower_limit, upper_limit
```

Out[ ]:

```
(0.20250000000000004, 0.8624999999999999)
```

In [ ]:

```
new_df = df.loc[(df['Whole weight'] <= upper_limit) & (df['Whole weight']
>= lower_limit)]
print('before removing outliers:', len(df))
print('after removing outliers:',len(new_df))
print('outliers:', len(df)-len(new_df))
```

```
before removing outliers: 4177
after removing outliers: 1872
outliers: 2305
```

In [ ]:

```
new_df = df.copy()
new_df.loc[(new_df['Whole weight']>upper_limit), 'Whole weight'] =
upper_limit
new_df.loc[(new_df['Whole weight']<lower_limit), 'Whole weight'] =
lower_limit
```

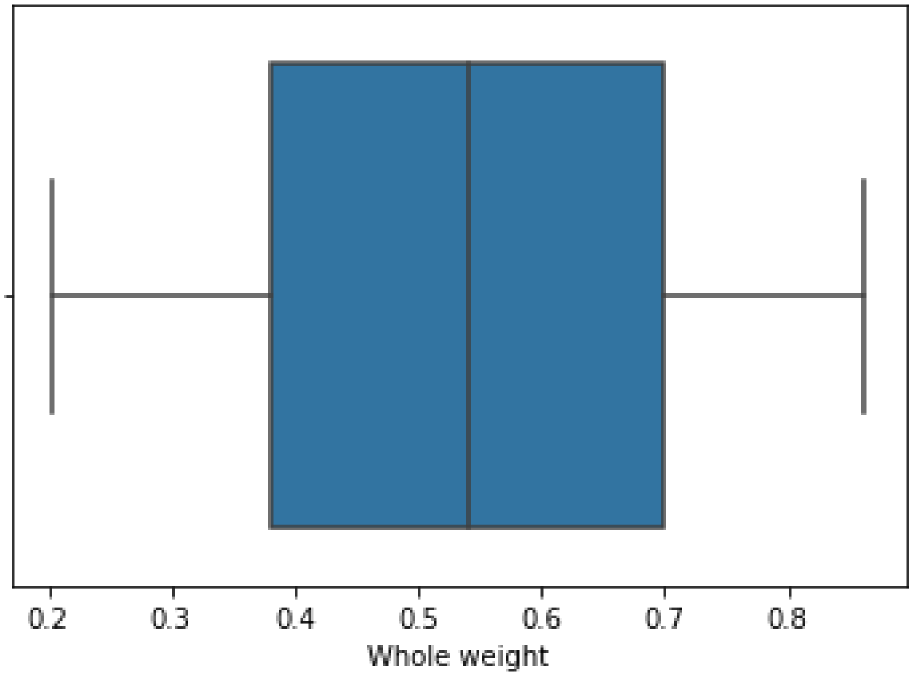
```
/usr/local/lib/python3.7/dist-packages/pandas/core/indexing.py:1817: Settin
gWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead
```

```
See the caveats in the documentation: https://pandas.pydata.org/pandas-docs
/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  self._setitem_single_column(loc, value, pi)
```

In [ ]:

```
sns.boxplot(x=new_df['Whole weight'])
```

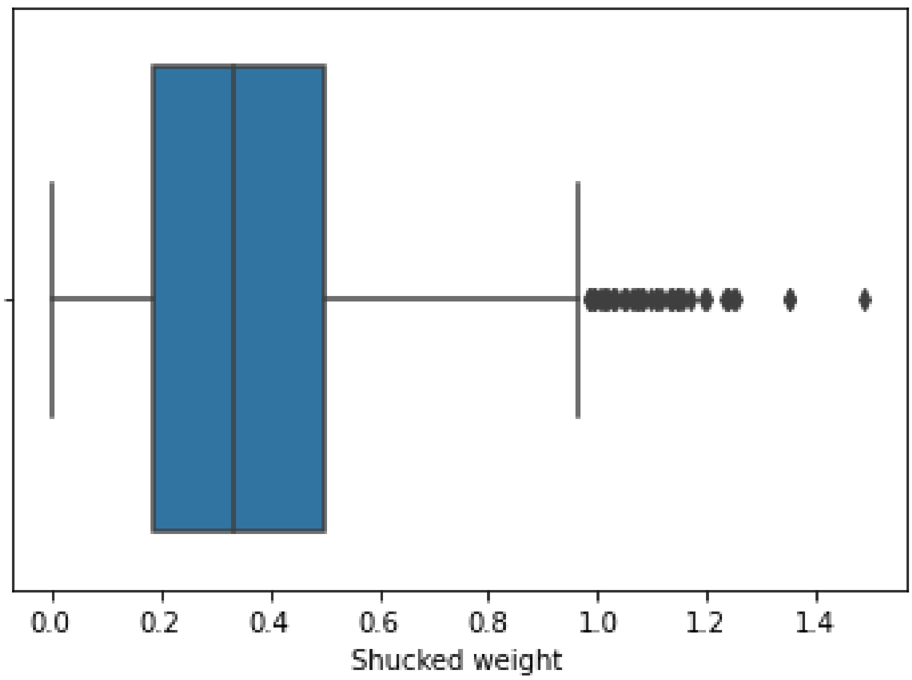
Out[ ]:



In [ ]:

```
#Shucked weight
sns.boxplot(x=df['Shucked weight'])
```

Out[ ]:



In [ ]:

```
q1 = df['Shucked weight'].quantile(0.25)
q2 = df['Shucked weight'].quantile(0.75)
iqr = q2-q1
q1, q2, iqr
```

Out[ ]:

```
(0.45, 0.615, 0.16499999999999998)
```

In [ ]:

```
upper_limit = q2 + (1.5 * iqr)
lower_limit = q1 - (1.5 * iqr)
lower_limit, upper_limit
```

Out[ ]:

```
(0.20250000000000004, 0.8624999999999999)
```

In [ ]:

```
new_df = df.loc[(df['Shucked weight'] <= upper_limit) & (df['Shucked 
weight'] >= lower_limit)]
print('before removing outliers:', len(df))
print('after removing outliers:',len(new_df))
print('outliers:', len(df)-len(new_df))
```

```
before removing outliers: 4177
after removing outliers: 2900
outliers: 1277
```

In [ ]:

```
new_df = df.copy()
new_df.loc[(new_df['Shucked weight']>upper_limit), 'Shucked weight'] = 
upper_limit
new_df.loc[(new_df['Shucked weight']<lower_limit), 'Shucked weight'] = 
lower_limit
```

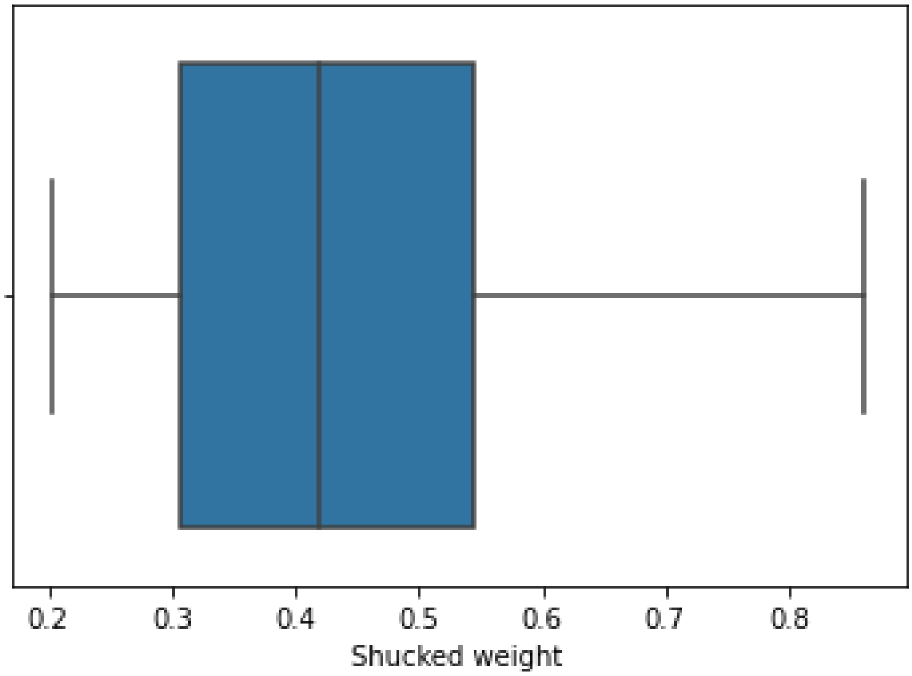
```
/usr/local/lib/python3.7/dist-packages/pandas/core/indexing.py:1817: Settin
gWithCopyWarning: 
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs
/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  self._setitem_single_column(loc, value, pi)
```

In [ ]:

```
sns.boxplot(x=new_df['Shucked weight'])
```

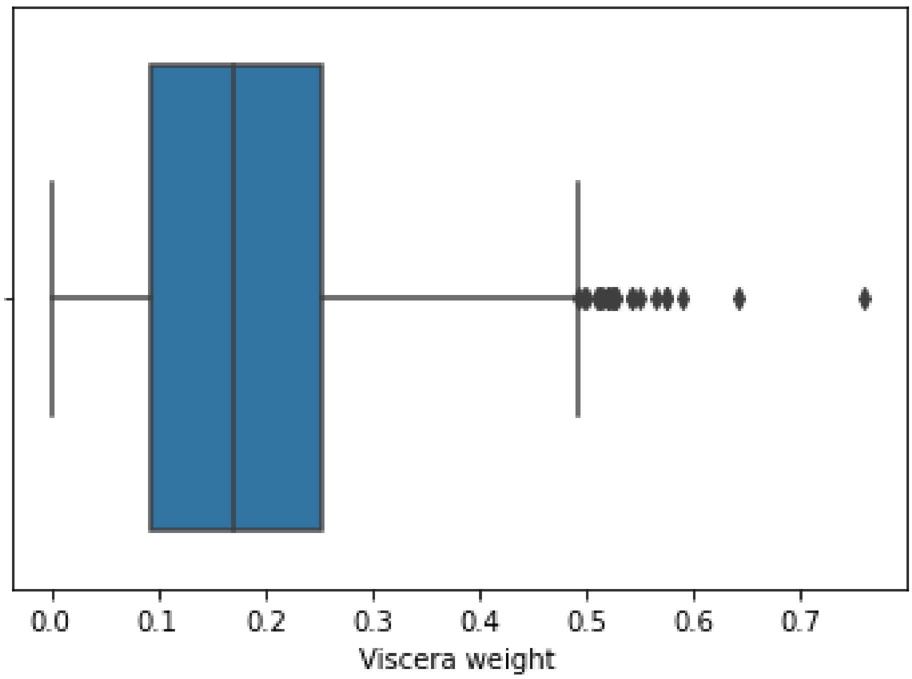
Out[ ]:



In [ ]:

```
#Viscera weight
sns.boxplot(x=df['Viscera weight'])
```

Out[ ]:



In [ ]:

```
q1 = df['Viscera weight'].quantile(0.25)
q2 = df['Viscera weight'].quantile(0.75)
iqr = q2-q1
q1, q2, iqr
```

Out[ ]:

```
(0.45, 0.615, 0.16499999999999998)
```

In [ ]:

```
upper_limit = q2 + (1.5 * iqr)
lower_limit = q1 - (1.5 * iqr)
lower_limit, upper_limit
```

Out[ ]:

```
(0.20250000000000004, 0.8624999999999999)
```

In [ ]:

```
new_df = df.loc[(df['Viscera weight'] <= upper_limit) & (df['Viscera weight'] >= lower_limit)]
print('before removing outliers:', len(df))
print('after removing outliers:',len(new_df))
print('outliers:', len(df)-len(new_df))
```

```
before removing outliers: 4177
after removing outliers: 1646
outliers: 2531
```

In [ ]:

```
new_df = df.copy()
new_df.loc[(new_df['Viscera weight']>upper_limit), 'Viscera weight'] = upper_limit
new_df.loc[(new_df['Viscera weight']<lower_limit), 'Viscera weight'] = lower_limit
```

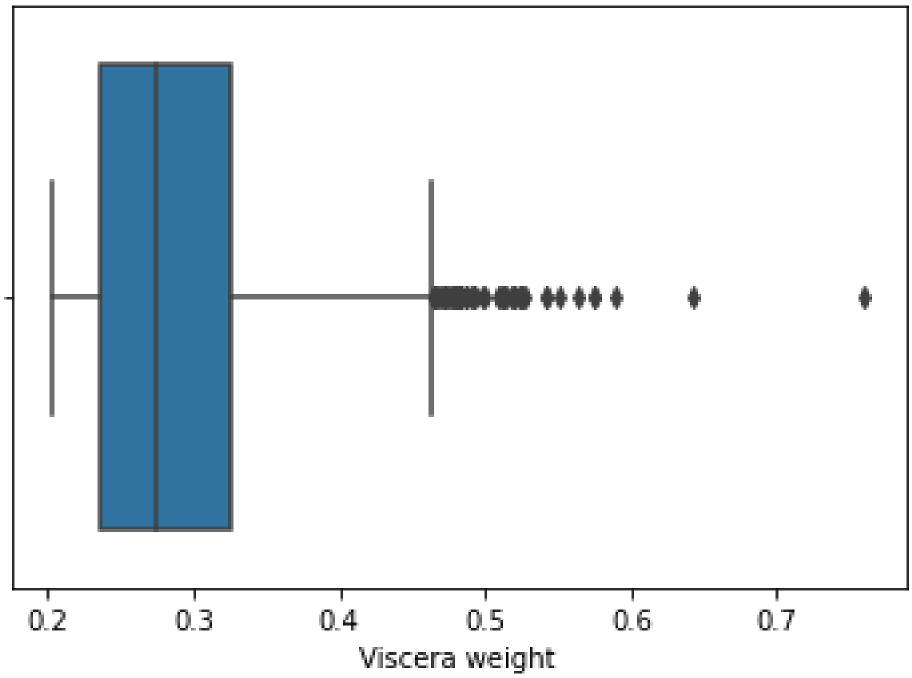
```
/usr/local/lib/python3.7/dist-packages/pandas/core/indexing.py:1817: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  self._setitem_single_column(loc, value, pi)
```

In [ ]:

```
sns.boxplot(x=new_df['Viscera weight'])
```

Out[ ]:

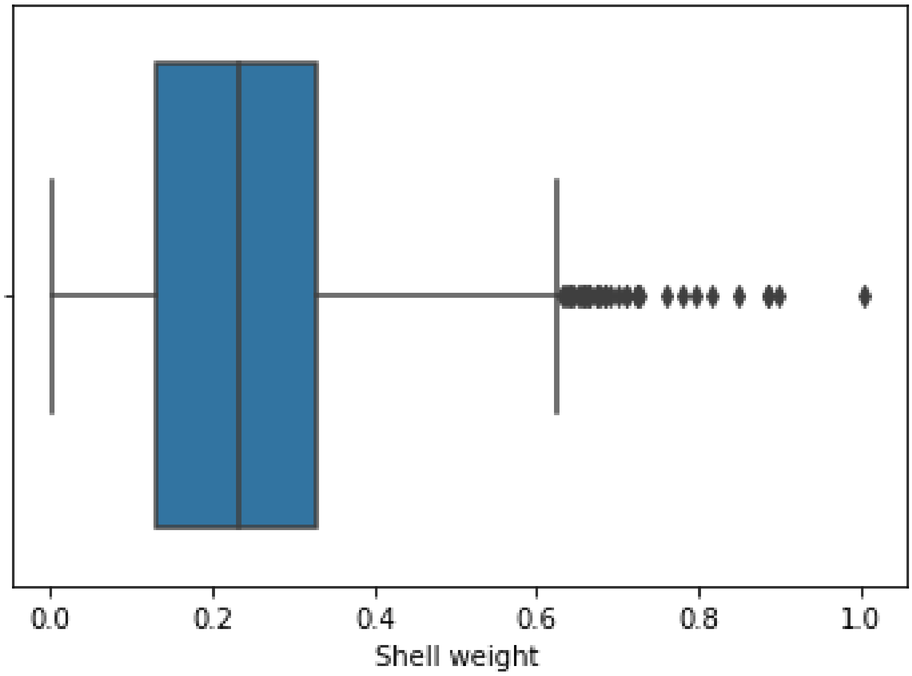


In [ ]:

```
#shell weight
```

```
sns.boxplot(x=df['Shell weight'])
```

Out[ ]:



In [ ]:

```
q1 = df['Shell weight'].quantile(0.25)
q2 = df['Shell weight'].quantile(0.75)
iqr = q2-q1
q1, q2, iqr
```

Out[ ]:

```
(0.45, 0.615, 0.16499999999999998)
```

In [ ]:

```
upper_limit = q2 + (1.5 * iqr)
lower_limit = q1 - (1.5 * iqr)
lower_limit, upper_limit
```

Out[ ]:

```
(0.20250000000000004, 0.8624999999999999)
```

In [ ]:

```
new_df = df.loc[(df['Shell weight'] <= upper_limit) & (df['Shell weight']
>= lower_limit)]
print('before removing outliers:', len(df))
print('after removing outliers:',len(new_df))
print('outliers:', len(df)-len(new_df))
```

```
before removing outliers: 4177
after removing outliers: 2373
outliers: 1804
```

In [ ]:

```
new_df = df.copy()
new_df.loc[(new_df['Shell weight']>upper_limit), 'Shell weight'] =
upper_limit
new_df.loc[(new_df['Shell weight']<lower_limit), 'Shell weight'] =
lower_limit
```

```
/usr/local/lib/python3.7/dist-packages/pandas/core/indexing.py:1817: Settin
gWithCopyWarning:
```

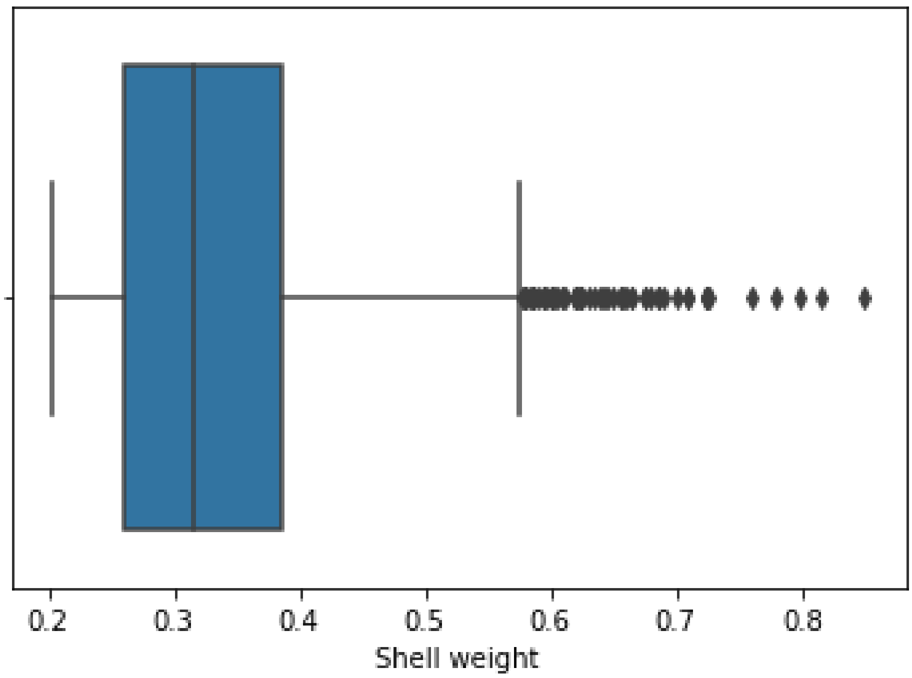
```
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs
/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  self._setitem_single_column(loc, value, pi)
```

In [ ]:

```
sns.boxplot(x=new_df['Shell weight'])
```

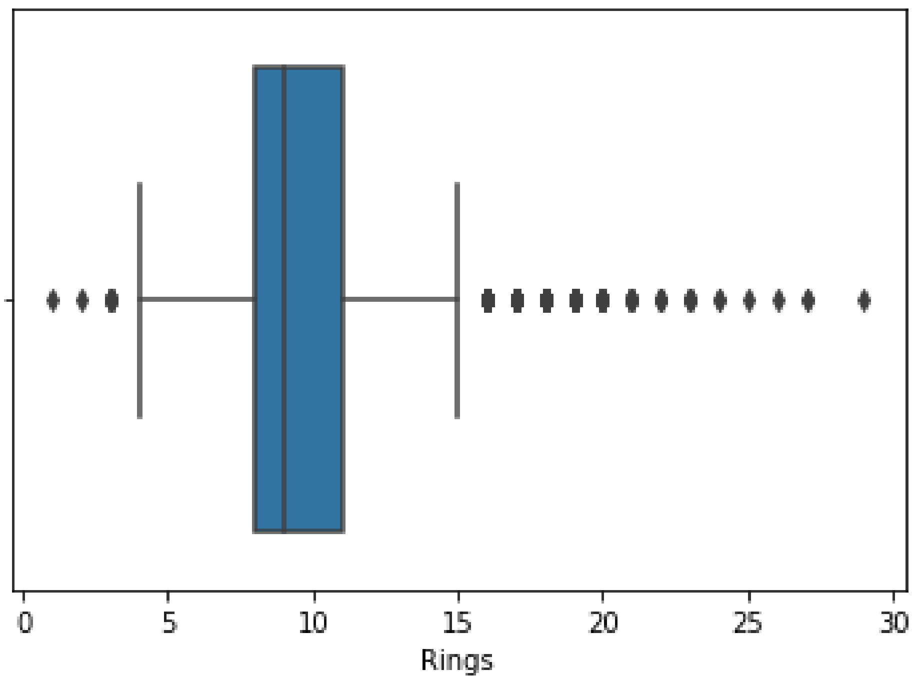
Out[ ]:



In [ ]:

```
#Rings
sns.boxplot(x=df['Rings'])
```

Out[ ]:



In [ ]:

```
q1 = df['Rings'].quantile(0.25)
q2 = df['Rings'].quantile(0.75)
iqr = q2-q1
q1, q2, iqr
```

Out[ ]:

```
(0.45, 0.615, 0.16499999999999998)
```

In [ ]:

```
upper_limit = q2 + (1.5 * iqr)
lower_limit = q1 - (1.5 * iqr)
lower_limit, upper_limit
```

Out[ ]:

```
(0.20250000000000004, 0.8624999999999999)
```

In [ ]:

```
new_df = df.loc[(df['Rings'] <= upper_limit) & (df['Rings'] >=
lower_limit)]
print('before removing outliers:', len(df))
print('after removing outliers:',len(new_df))
print('outliers:', len(df)-len(new_df))
```

```
before removing outliers: 4177
after removing outliers: 0
outliers: 4177
```

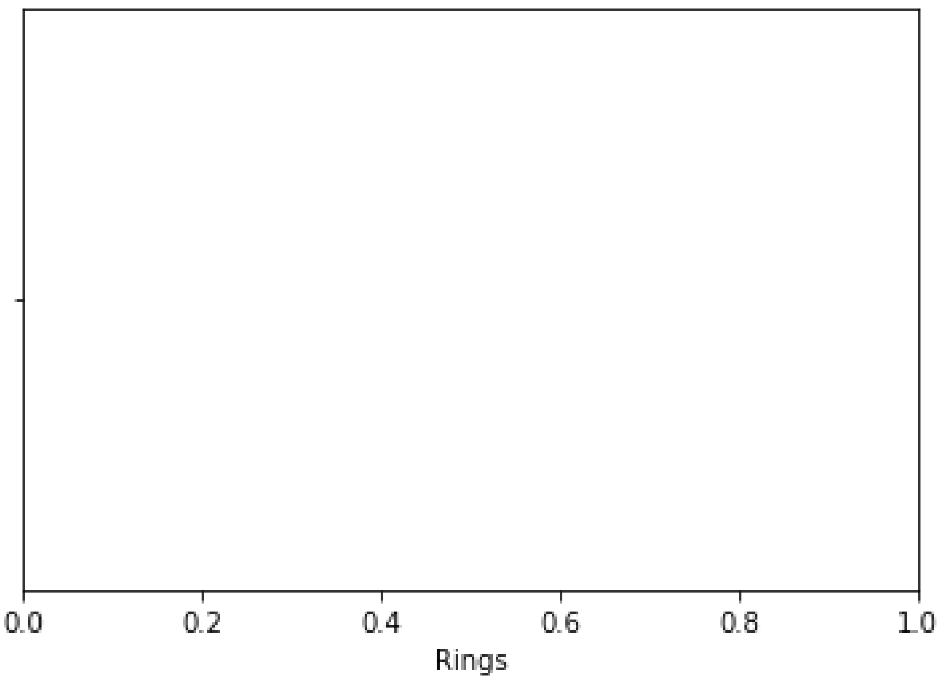
In [ ]:

```
new_df = df.copy()
new_df.loc[(new_df['Rings']>upper_limit), 'Rings'] = upper_limit
new_df.loc[(new_df['Rings']<lower_limit), 'Rings'] = lower_limit
```

In [219]:

```
sns.boxplot(x=new_df['Rings'])
```

Out[219]:



7. Check for Categorical columns and perform encoding

In [ ]:

```
df['Sex'].replace({'M':1,'F':0,'I':2},inplace=True)
df
```

Out[ ]:

	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

	Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings
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

In [ ]:

```
from sklearn.preprocessing import LabelEncoder,OneHotEncoder,StandardScaler
```

In [ ]:

```
label_encoder =LabelEncoder()
df['Sex']= label_encoder.fit_transform(df['Sex'])
df
```

Out[ ]:

	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

In [ ]:

```
enc = OneHotEncoder(drop='first')

enc_df = pd.DataFrame(enc.fit_transform(df[['Sex']]).toarray())

df =df.join(enc_df)
df.head()
```

Out[ ]:

	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

8. Split the data into dependent and independent variables

In [ ]:

```
x= df.iloc[:,1:8]
x
```

Out[ ]:

	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight
0	0.455	0.365	0.095	0.5140	0.2245	0.1010	0.1500
1	0.350	0.265	0.090	0.2255	0.0995	0.0485	0.0700
2	0.530	0.420	0.135	0.6770	0.2565	0.1415	0.2100
3	0.440	0.365	0.125	0.5160	0.2155	0.1140	0.1550
4	0.330	0.255	0.080	0.2050	0.0895	0.0395	0.0550
...	...	...	...	...	...	...	...
4172	0.565	0.450	0.165	0.8870	0.3700	0.2390	0.2490

	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight
4173	0.590	0.440	0.135	0.9660	0.4390	0.2145	0.2605
4174	0.600	0.475	0.205	1.1760	0.5255	0.2875	0.3080
4175	0.625	0.485	0.150	1.0945	0.5310	0.2610	0.2960
4176	0.710	0.555	0.195	1.9485	0.9455	0.3765	0.4950

4177 rows × 7 columns

In [ ]:

```
y=df.iloc[:,8]
y
```

Out[ ]:

```
0       15
1        7
2        9
3       10
4        7
        ..
4172    11
4173    10
4174     9
4175    10
4176    12
Name: Rings, Length: 4177, dtype: int64
```

9. Scale the independent variables

In [ ]:

```
scale = StandardScaler()
scaledX = scale.fit_transform(x)

print(scaledX)
```

```
[[-0.57455813 -0.43214879 -1.06442415 ... -0.60768536 -0.72621157
  -0.63821689]
 [-1.44898585 -1.439929   -1.18397831 ... -1.17090984 -1.20522124
  -1.21298732]
 [ 0.05003309  0.12213032 -0.10799087 ... -0.4634999  -0.35668983
  -0.20713907]
 ...
 [ 0.6329849   0.67640943  1.56576738 ...  0.74855917  0.97541324
   0.49695471]
 [ 0.84118198  0.77718745  0.25067161 ...  0.77334105  0.73362741
   0.41073914]
 [ 1.54905203  1.48263359  1.32665906 ...  2.64099341  1.78744868
   1.84048058]]
```

10. Split the data into training and testing

In [ ]:

```
from sklearn.model_selection import train_test_split
```

In [ ]:

```
x_train, x_test, y_train, y_test = train_test_split(x,y, test_size = 0.2)
```

In [ ]:

```
print(x.shape, x_train.shape, x_test.shape,y_train.shape, y_test.shape)
```

```
(4177, 7) (3341, 7) (836, 7) (3341,) (836,)
```

11. Build the Model

In [ ]:

```
from sklearn.linear_model import LinearRegression
```

In [ ]:

```
linearmodel = LinearRegression()
```

12. Train the Model

In [ ]:

```
linearmodel.fit(x_train, y_train)
```

Out[ ]:

```
LinearRegression()
```

13. Test the Model

In [ ]:

```
y_train_pred = linearmodel.predict(x_train)
y_test_pred = linearmodel.predict(x_test)
```

In [ ]:

```
y_test_pred
```

Out[ ]:

```
array([ 8.70365574, 10.39057789,  9.40293106, 10.68158892,  7.57464889,
        4.79636131,  8.67332668, 14.02754984,  9.87864789,  7.25750569,
       10.85233616,  8.50778462,  7.15078854,  9.32393986,  5.76619464,
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```

14. Measure the performance using Metrics

In [ ]:

```
from sklearn.metrics import mean_absolute_error, mean_squared_error
s = mean_squared_error(y_train, y_train_pred)
print('Mean Squared error of training set :%2f'%s)
```

In [ ]:

```
p = mean_squared_error(y_test, y_test_pred)
print('Mean Squared error of testing set :%2f'%p)
```

```
Mean Squared error of testing set :4.869245
```

In [ ]:

```
# Build the Model
from sklearn.ensemble import RandomForestRegressor
```

In [ ]:

```
rfr = RandomForestRegressor(max_depth=2, random_state=0,
                              n_estimators=100)
```

In [ ]:

```
rfr.fit(x_train, y_train)
rfr.fit(x_test, y_test)
```

Out[ ]:

```
RandomForestRegressor(max_depth=2, random_state=0)
```

In [ ]:

```
#Test the model
y_train_pred = rfr.predict(x_train)
y_test_pred = rfr.predict(x_test)
```

In [ ]:

```
#measure the performance using metrics
rfr.score(x_test, y_test)
```

Out[ ]:

```
0.4497726034378102
```

K Neighbors Regression

In [ ]:

```
#Build the model
from sklearn.neighbors import KNeighborsRegressor
```

In [ ]:

```
knr = KNeighborsRegressor(n_neighbors =4 )
```

In [ ]:

```
#Train the model
knr.fit(x_train, y_train)
knr.fit(x_test, y_test)
```

Out[ ]:

```
KNeighborsRegressor(n_neighbors=4)
```

In [ ]:

```
#Test the model
y_train_pred = knr.predict(x_train)
y_test_pred = knr.predict(x_test)
```

In [ ]:

```
#Measure the performance using Metrics
knr.score(x_train, y_train)
```

Out[ ]:

```
0.458628955466746
```

Decision Tree Regression

In [ ]:

```
#Build the model
from sklearn.tree import DecisionTreeRegressor
```

dtr = DecisionTreeRegressor(random_state=0)

In [ ]:

```
#Train the model
dtr.fit(x_test,y_test)
```

Out[ ]:

```
DecisionTreeRegressor(random_state=0)
```

Test the model

y_train_pred = dtr.predict(x_train) y_test_pred = dtr.predict(x_test)

In [ ]:

```
#Mesure the performance using Metrics
dtr.score(x_train, y_train)
```

Out[ ]:

```
0.15715160117393523
```

Lasso Regression

In [214]:

```
#Build the model
from sklearn.linear_model import Lasso
```

In [215]:

```
lr=Lasso(alpha=0.01)
```

In [216]:

```
#Train the model
lr.fit(x_train,y_train)
```

Out[216]:

```
Lasso(alpha=0.01)
```

In [217]:

```
y_train_pred = lr.predict(x_train)
y_test_pred = lr.predict(x_test)
```

In [218]:

```
#Measure the performance using Metrics
lr.score(x_train, y_train)
```

Out[218]:

```
0.5098141532900928
```