Assignment -3

Python Programming

Assignment Date	7 October 2022
Student Name	Sowmiya T
Student Roll Number	812419106046
Maximum Marks	2 Marks

In [121]:
```
import os
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import LabelEncoder

from sklearn.linear_model import LinearRegression
from sklearn import  metrics

%matplotlib inline
```

In [122]:
```
os.getcwd()
```

Out[122]: 'C:\\Users\\pc'

In [123]:
```
path='C:\\Users\\pc\\downloads\\'
data=pd.read_csv(path+'abalone.csv')
data
```

Out[123]:

	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

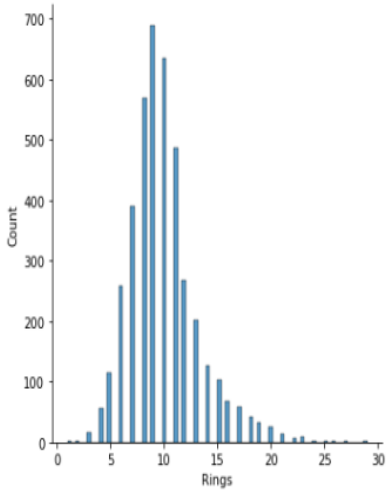
In [124]:
```
data.shape
```

Out[124]: (4177, 9)

In [125]:
```
sns.displot(data['Rings'])
```

Out[125]: <seaborn.axisgrid.FacetGrid at 0x2bef651b370>

Out[125]: <seaborn.axisgrid.FacetGrid at 0x2bef651b370>



In [126]:
```
sns.barplot(x='Sex',y='Rings',data=data)
```

Out[126]: <AxesSubplot:xlabel='Sex', ylabel='Rings'>

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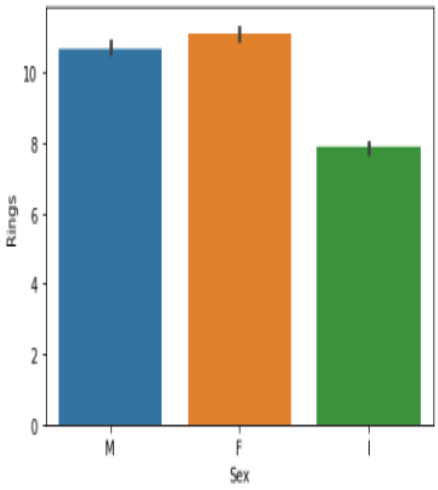
```
sns.barplot(x='Sex',y='Rings',data=data)
```

Out[126]: <AxesSubplot:xlabel='Sex', ylabel='Rings'>

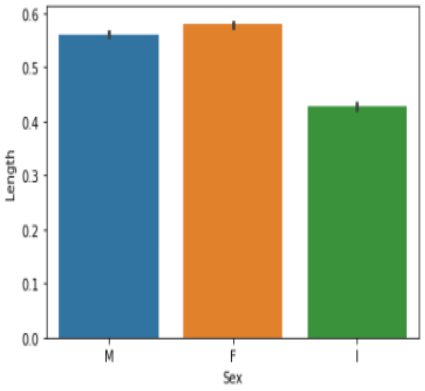


In [127]:
```
sns.barplot(x='Sex',y='Length',data=data)
```

Out[127]: <AxesSubplot:xlabel='Sex', ylabel='Length'>

In [127]:
```
sns.barplot(x='Sex',y='Length',data=data)
```

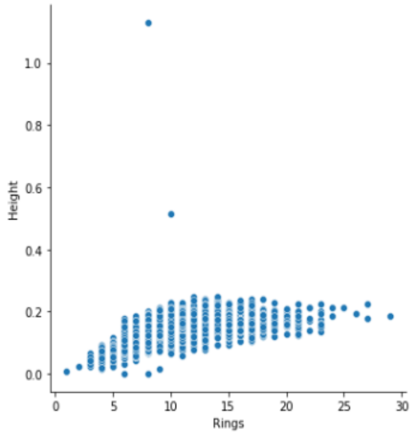
Out[127]: <AxesSubplot:xlabel='Sex', ylabel='Length'>



In [128]:
```
sns.relplot(x='Rings',y='Height',data=data)
```

Out[128]: <seaborn.axisgrid.FacetGrid at 0x2bef76a8880>

Out[128]: <seaborn.axisgrid.FacetGrid at 0x2bef76a8880>



In [129]:
```python
import warnings
warnings.simplefilter(action='ignore', category=FutureWarning)# to avoid warning
```

In [129]:
```python
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warnings.simplefilter(action='ignore', category=FutureWarning)# to avoid warning
```

In [55]:
```python
sns.pairplot(data= data [['Sex', 'Length', 'Diameter', 'Height', 'Whole weight', 'Rings']],hue='Rings')
```

```
C:\Users\pc\anaconda3\lib\site-packages\seaborn\distributions.py:305: UserWarning: Dataset has 0 variance; skipping density e
stimate.
  warnings.warn(msg, UserWarning)
C:\Users\pc\anaconda3\lib\site-packages\seaborn\distributions.py:305: UserWarning: Dataset has 0 variance; skipping density e
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  warnings.warn(msg, UserWarning)
C:\Users\pc\anaconda3\lib\site-packages\seaborn\distributions.py:305: UserWarning: Dataset has 0 variance; skipping density e
```

In [130]:
```python
data.isnull().sum()
```

Out[130]:
```
Sex            0
Length         0
Diameter       0
Height         0
```

Out[130]:
```
Sex               0
Length            0
Diameter          0
Height            0
Whole weight      0
Shucked weight    0
Viscera weight    0
Shell weight      0
Rings             0
dtype: int64
```

In [131]:
```
data.describe()
```

Out[131]:

	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 [132]:
```
data.skew()
```

Out[132]:
```
Length           -0.639873
Diameter         -0.609198
Height            3.128817
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 [120]:
```
sns.boxplot(data['Rings'])
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
<ipython-input-120-0f1ddebe65a1> in <module>
----> 1 sns.boxplot(data['Rings'])

TypeError: list indices must be integers or slices, not str
```

In [134]:
```
q1=data['Rings'] . describe()['25%']
q3=data['Rings'] . describe()['75%']
q1
```

Out[134]:
```
8.0
```

Type *Markdown* and LaTeX: α^2

In [84]:
```
q3
```

Out[84]:
```
11.0
```

In [85]:
```
iqr=q3-q1
iqr
```

Out[85]:
```
3.0
```

In [86]:
```
a=q1-(1.5*q1)
b=q3+(1.5*q3)
print(a, b)
```

```
-4.0 27.5
```

In [87]:
```
data[data['Rings']<a]
```

Out[87]:

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

In [88]:
```
data[data['Rings']>b].head()
```

Out[88]:

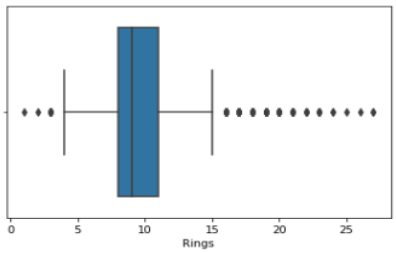
	Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings
480	F	0.7	0.585	0.185	1.8075	0.7055	0.3215	0.475	29

In [89]:
```
outlier_list=list(data[data['Rings']>b]['Rings'])
print(outlier_list)
```

```
[29]
```

In [90]:
```
data['Rings']=data['Rings'].replace(outlier_list)
sns.boxplot(data['Rings'])
```

Out[90]:
```
<AxesSubplot:xlabel='Rings'>
```



In [95]:
```
le=LabelEncoder()
data['Sex']=le.fit_transform(data['Sex'])
data
```

Out[95]:

	Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings
0	2	0.455	0.365	0.095	0.5140	0.2245	0.1010	0.1500	15
1	2	0.350	0.265	0.090	0.2255	0.0995	0.0485	0.0700	7
2	0	0.530	0.420	0.135	0.6770	0.2565	0.1415	0.2100	9
3	2	0.440	0.365	0.125	0.5160	0.2155	0.1140	0.1550	10
4	1	0.330	0.255	0.080	0.2050	0.0895	0.0395	0.0550	7
...	...	...	...	...	...	...	...	...	...
4172	0	0.565	0.450	0.165	0.8870	0.3700	0.2390	0.2490	11
4173	2	0.590	0.440	0.135	0.9660	0.4390	0.2145	0.2605	10

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4175	0	0.625	0.485	0.150	1.0945	0.5310	0.2610	0.2960	10
4176	2	0.710	0.555	0.195	1.9485	0.9455	0.3765	0.4950	12

4177 rows × 9 columns

In [96]:
```
X = data.iloc[:, :-1].values
y = data.iloc[:, -1].values
```

In [97]:
```
train_X,val_X,train_y,val_y = train_test_split(X, y, test_size = 0.2, random_state = 0)
print("Shape of Training X :",train_X.shape)
print("Shape of Validation X :",val_X.shape)
```

```
Shape of Training X : (3341, 8)
Shape of Validation X : (836, 8)
```

In [98]:
```
lr = LinearRegression()
lr.fit(train_X,train_y)
print('Attempting to fit Linear Regressor')
```

```
Attempting to fit Linear Regressor
```

In [105]:
```
%%time
y_pred_val_lr = lr.predict(val_X)
print('MAE on Validation set :',metrics.mean_absolute_error(val_y, y_pred_val_lr))
print("\n")
print('MSE on Validation set :',metrics.mean_squared_error(val_y, y_pred_val_lr))
print("\n")
print('RMSE on Validation set :',np.sqrt(metrics.mean_absolute_error(val_y, y_pred_val_lr)))
print("\n")
print('R2 Score on Validation set :',metrics.r2_score(val_y, y_pred_val_lr))
print("\n")
```

```
MAE on Validation set : 1.5786845608962012


MSE on Validation set : 4.7449590677450635


RMSE on Validation set : 1.2564571464623062


R2 Score on Validation set : 0.5466388609280107


Wall time: 6 ms
```

In [ ]: