Import library

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

import warnings
warnings.filterwarnings("ignore")
```

Load the dataset

In [2]:
```
data = pd.read_csv("abalone.csv")
```

Visualising 1st 5 rows

In [3]:
```
data.head()
```

Out[3]:

	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 [4]:
```
data.tail()
```

Out[4]:

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

In [5]:
```
data.shape
```

Out[5]:
```
(4177, 9)
```

In [6]:
```
data.info
```

Out[6]:

In [7]:
```
data.nunique()
```

Out[7]:
```
Sex                3
Length           134
Diameter         111
Height            51
Whole weight    2429
Shucked weight  1515
Viscera weight   880
Shell weight     926
Rings             28
dtype: int64
```

Duplicate

In [8]:
```
data.duplicated()
```

Out[8]:
```
0       False
1       False
2       False
3       False
4       False
        ...
4172    False
4173    False
4174    False
4175    False
4176    False
Length: 4177, dtype: bool
```

In [ ]:
```
data.duplicated().sum()
```

Out[ ]:
```
0
```

Columns of the dataset

In [9]:
```
data.columns
```

Out[9]:
```
Index(['Sex', 'Length', 'Diameter', 'Height', 'Whole weight', 'Shucked weight',
       'Viscera weight', 'Shell weight', 'Rings'],
      dtype='object')
```

Missing values

In [10]:
```
data.isna()
```

Out[10]:

	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
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 [11]:
```
data.isnull().any()
```

Out[11]:
```
Sex               False
Length            False
Diameter          False
Height            False
Whole weight      False
Shucked weight    False
Viscera weight    False
Shell weight      False
Rings             False
dtype: bool
```

Descriptive statistics

In [12]:
```
data.describe()
```

Out[12]:

	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 [13]:
```
data.head()
```

Out[13]:

	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 [14]:
```
data["Sex"].unique()
```

Out[14]:
```
array(['M', 'F', 'I'], dtype=object)
```

Feature mapping

In [15]:
```
data["Sex"].replace({"M":1,"F":0,"I":2},inplace= True)
```

In [16]:
```
data.head()
```

Out[16]:

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

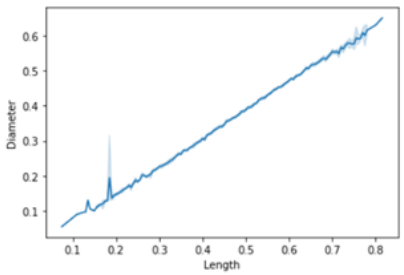
In [17]:
```
data.describe()
```

Out[17]:

	Sex	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	4177.000000
mean	1.008379	0.523992	0.407881	0.139516	0.828742	0.359367	0.180594	0.238831	9.933684
std	0.796410	0.120093	0.099240	0.041827	0.490389	0.221963	0.109614	0.139203	3.224169
min	0.000000	0.075000	0.055000	0.000000	0.002000	0.001000	0.000500	0.001500	1.000000
25%	0.000000	0.450000	0.350000	0.115000	0.441500	0.186000	0.093500	0.130000	8.000000
50%	1.000000	0.545000	0.425000	0.140000	0.799500	0.336000	0.171000	0.234000	9.000000
75%	2.000000	0.615000	0.480000	0.165000	1.153000	0.502000	0.253000	0.329000	11.000000
max	2.000000	0.815000	0.650000	1.130000	2.825500	1.488000	0.760000	1.005000	29.000000

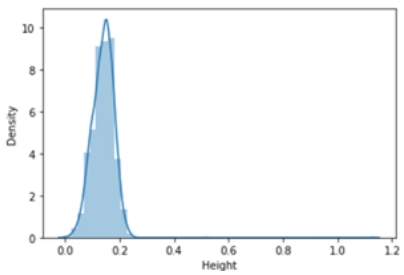
In [ ]:
```
sns.lineplot(data["Length"],data["Diameter"])
```

Out[ ]:



In [ ]:
```
sns.distplot(data["Height"])
```

Out[ ]:



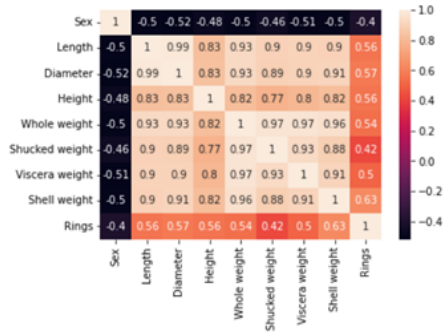
In [ ]:
```
data.corr()
```

Out[ ]:

	Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings
Sex	1.000000	-0.503697	-0.516450	-0.477850	-0.501511	-0.459731	-0.505693	-0.499103	-0.401445
Length	-0.503697	1.000000	0.986812	0.827554	0.925261	0.897914	0.903018	0.897706	0.556720
Diameter	-0.516450	0.986812	1.000000	0.833684	0.925452	0.893162	0.899724	0.905330	0.574660
Height	-0.477850	0.827554	0.833684	1.000000	0.819221	0.774972	0.798319	0.817338	0.557467
Whole weight	-0.501511	0.925261	0.925452	0.819221	1.000000	0.969405	0.966375	0.955355	0.540390
Shucked weight	-0.459731	0.897914	0.893162	0.774972	0.969405	1.000000	0.931961	0.882617	0.420884
Viscera weight	-0.505693	0.903018	0.899724	0.798319	0.966375	0.931961	1.000000	0.907656	0.503819
Shell weight	-0.499103	0.897706	0.905330	0.817338	0.955355	0.882617	0.907656	1.000000	0.627574
Rings	-0.401445	0.556720	0.574660	0.557467	0.540390	0.420884	0.503819	0.627574	1.000000

In [ ]:
```
sns.heatmap(data.corr(),annot = True)
```

Out[ ]:



In [18]:
```
data.corr().Rings.sort_values()
```

Out[18]:
```
Sex              -0.401445
Shucked weight    0.420884
Viscera weight    0.503819
Whole weight      0.540390
Length            0.556720
Height            0.557467
Diameter          0.574660
Shell weight      0.627574
Rings             1.000000
Name: Rings, dtype: float64
```

Split X & Y

In [19]:
```
x = data.drop("Rings",axis = 1)
y = data["Rings"]
```

In [20]:
```
x
```

Out[20]:

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

4177 rows × 8 columns

In [21]:
```
y
```

Out[21]:
```
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
```

Train test split

In [22]:
```
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= 42)
```

Initialize logistic regression

In [23]:
```
from sklearn.linear_model import LogisticRegression
```

In [24]:
```
log_reg = LogisticRegression()
```

In [25]:
```
log_reg.fit(x_train,y_train)
```

Out[25]:
```
LogisticRegression()
```

Testing model

In [26]:
```
pred = log_reg.predict(x_test)
```

Evalution

In [27]:
```
from sklearn.metrics import accuracy_score,precision_score,confusion_matrix
```

In [28]:
```
print("Accuracy score :",accuracy_score(y_test,pred))
```

```
Accuracy score : 0.2703349282296651
```