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

```
path = "/content/abalone.csv"
df = pd.read_csv(path)
df.head()
```

	Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shel
0	M	0.455	0.365	0.095	0.5140	0.2245	0.1010	
1	M	0.350	0.265	0.090	0.2255	0.0995	0.0485	
2	F	0.530	0.420	0.135	0.6770	0.2565	0.1415	
3	M	0.440	0.365	0.125	0.5160	0.2155	0.1140	
4	I	0.330	0.255	0.080	0.2050	0.0895	0.0395	

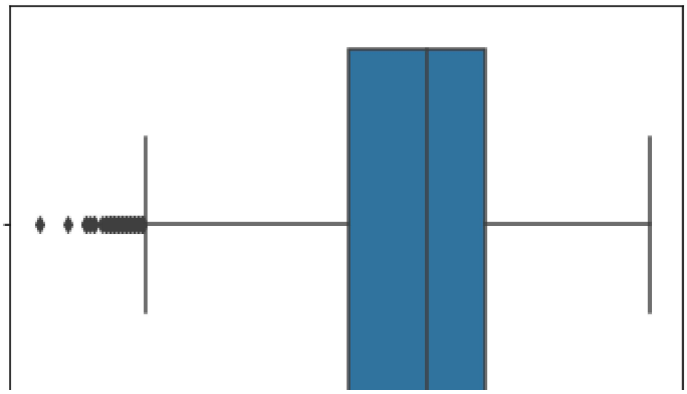
```
df.describe()
```

	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	
count	4177.000000	4177.000000	4177.000000	4177.000000	4177.000000	4177.000000	4
mean	0.523992	0.407881	0.139516	0.828742	0.359367	0.180594	
std	0.120093	0.099240	0.041827	0.490389	0.221963	0.109614	
min	0.075000	0.055000	0.000000	0.002000	0.001000	0.000500	
25%	0.450000	0.350000	0.115000	0.441500	0.186000	0.093500	
50%	0.545000	0.425000	0.140000	0.799500	0.336000	0.171000	
75%	0.615000	0.480000	0.165000	1.153000	0.502000	0.253000	
max	0.815000	0.650000	1.130000	2.825500	1.488000	0.760000	

```
df['age'] = df['Rings']+1.5
df = df.drop('Rings', axis = 1)
```

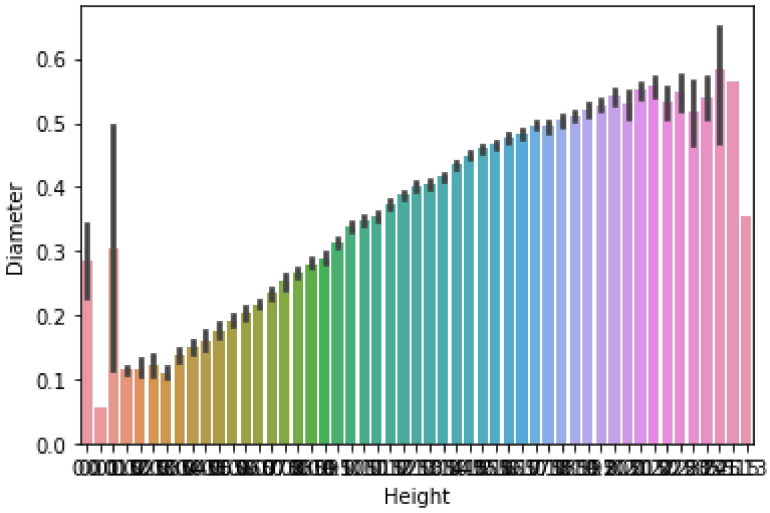
```
#Univariate Analysis
sbn.boxplot(df.Length)
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pas
  FutureWarning
<matplotlib.axes._subplots.AxesSubplot at 0x7fca10ec6e10>
```



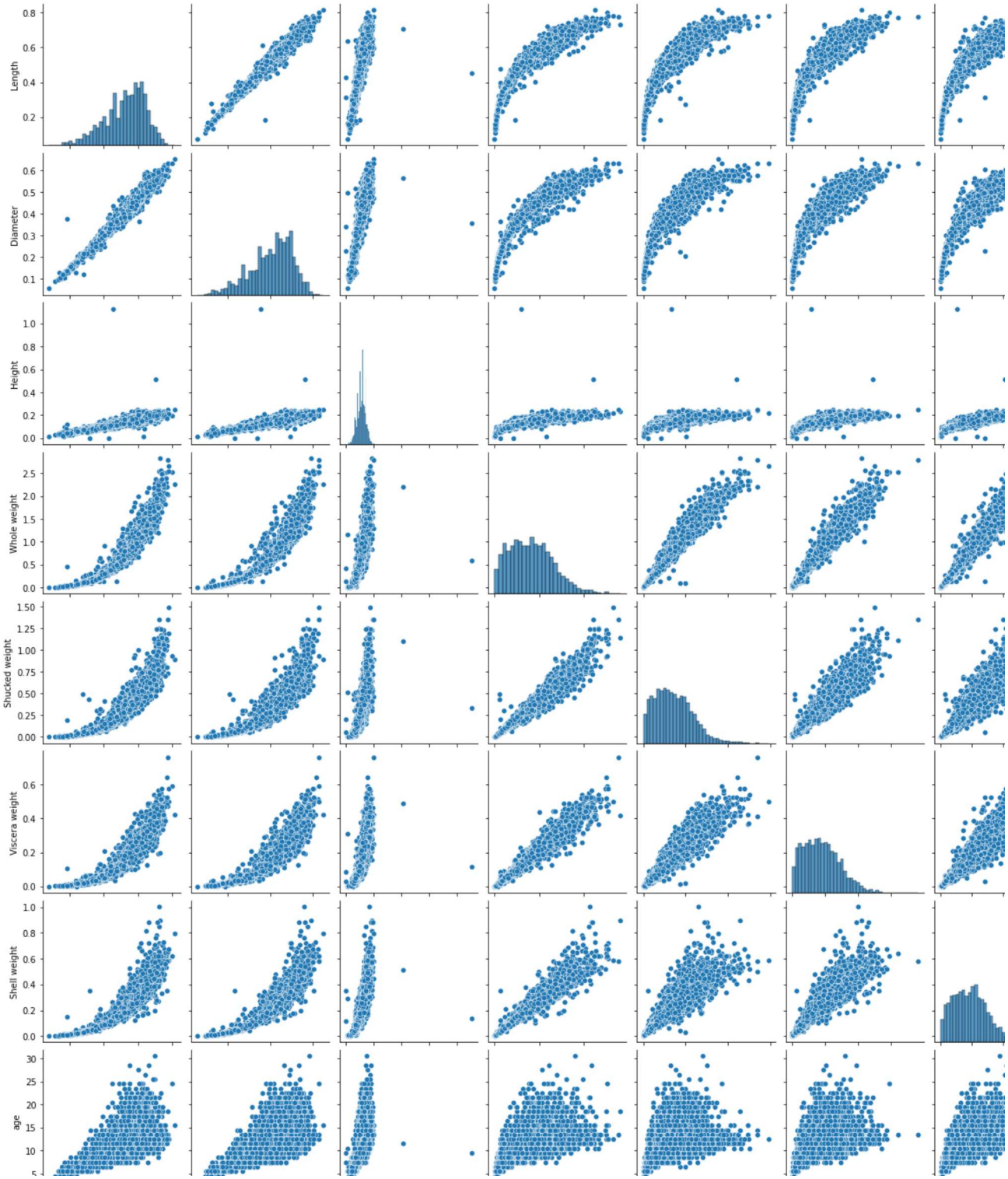
```
#Bi-Variant Analysis
sbn.barplot(x=df.Height,y=df.Diameter)
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fca106e4210>
```




```
#Multi-Variant Analysis
sbn.pairplot(df)
```

```
<seaborn.axisgrid.PairGrid at 0x7fca10578f50>
```




```
df.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   age             4177 non-null   float64
dtypes: float64(8), object(1)
memory usage: 293.8+ KB
```

```
df['Height'].mean()
```

```
0.13951639932966242
```

```
df['Diameter'].median()
```

```
0.425
```

```
df['Length'].mode()
```

```
0    0.550
1    0.625
dtype: float64
```

```
df.max()
```

```
Sex                 M
Length          0.815
Diameter         0.65
Height           1.13
Whole weight   2.8255
Shucked weight  1.488
Viscera weight   0.76
Shell weight    1.005
age              30.5
dtype: object
```

```
df.min()
```

```
Sex                 F
Length          0.075
Diameter        0.055
Height            0.0
Whole weight    0.002
Shucked weight  0.001
Viscera weight  0.0005
Shell weight    0.0015
age                2.5
dtype: object
```

```
#EDA
sbn.heatmap(df.isnull())
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fca0bed39d0>
```


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

```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:2: DeprecationWarning:
Deprecated in NumPy 1.20; for more details and guidance: https://numpy.org/devdocs/r
```

```
numerical_features
```

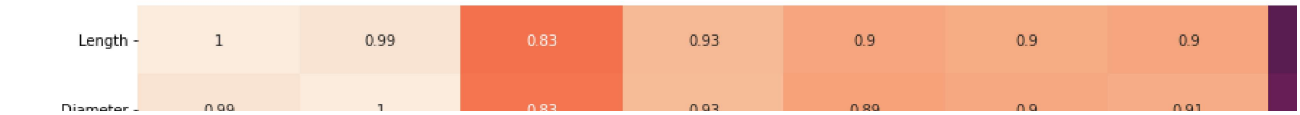
```
Index(['Length', 'Diameter', 'Height', 'Whole weight', 'Shucked weight',
       'Viscera weight', 'Shell weight', 'age'],
      dtype='object')
```

```
categorical_features
```

```
Index(['Sex'], dtype='object')
```

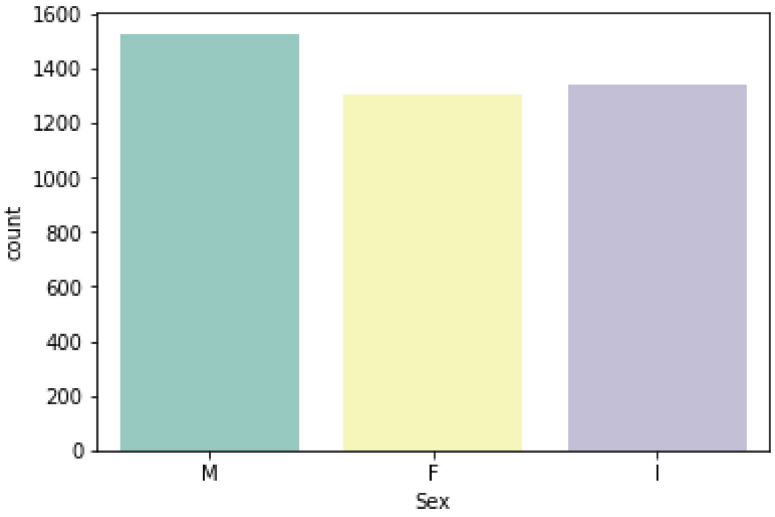
```
plt.figure(figsize = (20,7))
sbn.heatmap(df[numerical_features].corr(),annot = True)
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fca0bf1d8d0>
```




```
sbn.countplot(x = 'Sex', data = df, palette = 'Set3')
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fca0a264790>
```

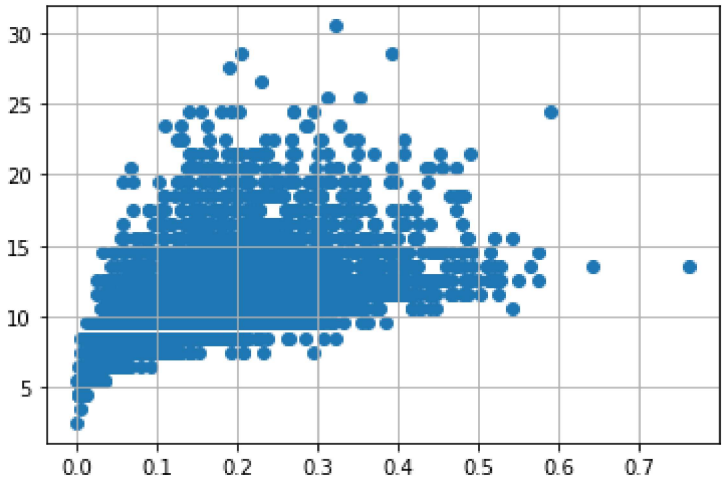



```
plt.figure(figsize = (20,7))
sbn.swarmplot(x = 'Sex', y = 'age', data = df, hue = 'Sex')
sbn.violinplot(x = 'Sex', y = 'age',data = df)
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/categorical.py:1296: UserWarning: 56.
  warnings.warn(msg, UserWarning)
```

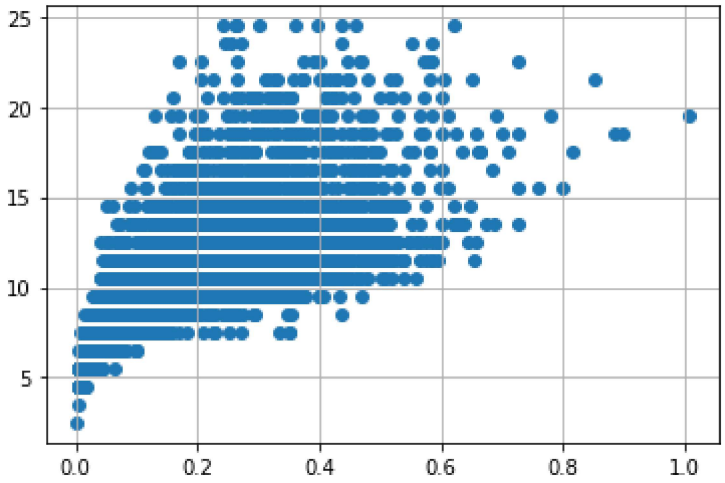
```
#Data Preprocessing
#Outlier handling
df = pd.get_dummies(df)
dummy_df = df
```

```
var = 'Viscera weight'
plt.scatter(x = df[var], y = df['age'])
plt.grid(True)
```



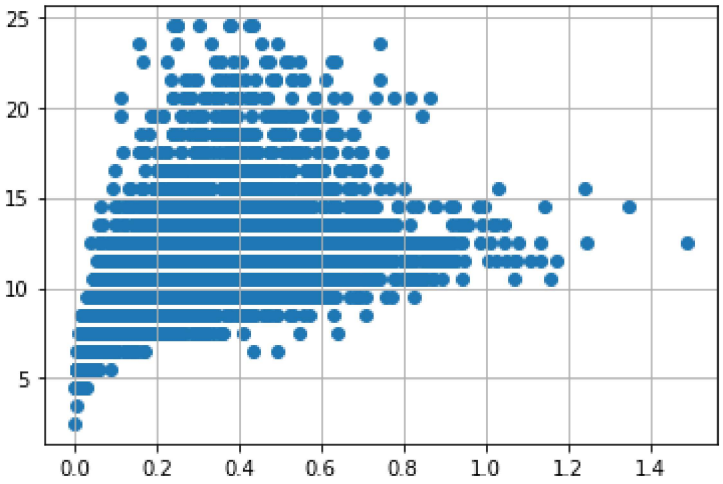

```
df.drop(df[(df['Viscera weight'] > 0.5) &
          (df['age'] < 20)].index, inplace = True)
df.drop(df[(df['Viscera weight']<0.5) & (
df['age'] > 25)].index, inplace = True)
```

```
var = 'Shell weight'
plt.scatter(x = df[var], y = df['age'])
plt.grid(True)
```



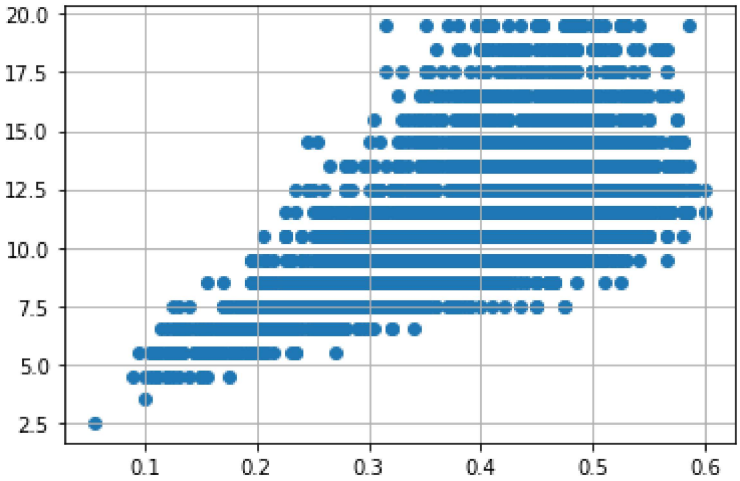

```
df.drop(df[(df['Shell weight'] > 0.6) & (df['age'] < 25)].index, inplace = True)
df.drop(df[(df['Shell weight']<0.8) & (df['age'] > 25)].index, inplace = True)
```

```
var = 'Shucked weight'
plt.scatter(x = df[var], y = df['age'])
plt.grid(True)
```



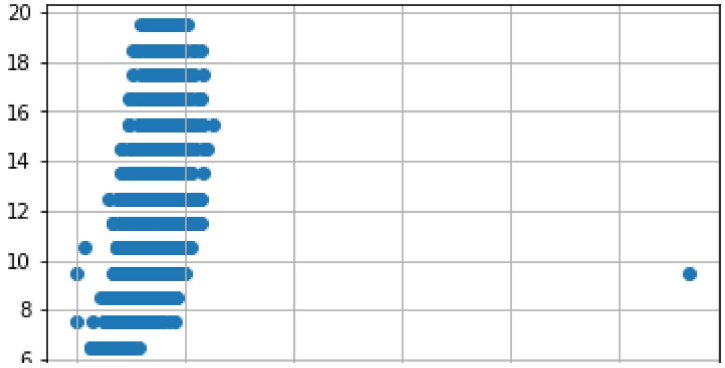

```
df.drop(df[(df['Shucked weight'] >= 1) & (df['age'] < 20)].index, inplace = True)
df.drop(df[(df['Viscera weight']<1) & (df['age'] > 20)].index, inplace = True)
```

```
var = 'Diameter'
plt.scatter(x = df[var], y = df['age'])
plt.grid(True)
```



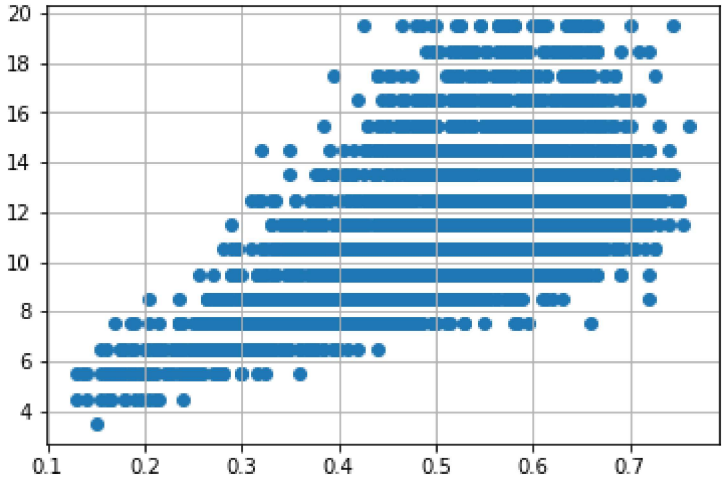

```
df.drop(df[(df['Diameter'] <0.1) & (df['age'] < 5)].index, inplace = True)
df.drop(df[(df['Diameter']<0.6) & (df['age'] > 25)].index, inplace = True)
df.drop(df[(df['Diameter']>=0.6) & (df['age'] < 25)].index, inplace = True)
```

```
var = 'Height'
plt.scatter(x = df[var], y = df['age'])
plt.grid(True)
```




```
df.drop(df[(df['Height'] > 0.4) &(df['age'] < 15)].index, inplace = True)
df.drop(df[(df['Height']<0.4) & (df['age'] > 25)].index, inplace = True)
```

```
var = 'Length'
plt.scatter(x = df[var], y = df['age'])
plt.grid(True)
```




```
df.drop(df[(df['Length'] <0.1) &(df['age'] < 5)].index, inplace = True)
df.drop(df[(df['Length']<0.8) & (df['age'] > 25)].index, inplace = True)
df.drop(df[(df['Length']>=0.8) & (df['age'] < 25)].index, inplace = True)
```

```
X = df.drop('age', axis = 1)
y = df['age']
from sklearn.preprocessing import StandardScaler
from sklearn.model_selection import train_test_split, cross_val_score
from sklearn.feature_selection import SelectKBest
standardScale = StandardScaler()
standardScale.fit_transform(X)

selectkBest = SelectKBest()
X_new = selectkBest.fit_transform(X, y)

X_train, X_test, y_train, y_test = train_test_split(X_new, y, test_size = 0.25)


from sklearn.linear_model import LinearRegression
```

```
lm = LinearRegression()
lm.fit(X_train, y_train)
```

```
LinearRegression()
```

```
y_train_pred = lm.predict(X_train)
y_test_pred = lm.predict(X_test)
```

```
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)

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

```
Mean Squared Error of training set :3.477822
Mean Squared Error of testing set :3.805329
```

```
from sklearn.metrics import r2_score
s = r2_score(y_train, y_train_pred)
print('R2 Score of training set:%.2f'%s)

p = r2_score(y_test, y_test_pred)
print('R2 Score of testing set:%.2f'%p)
```

```
R2 Score of training set:0.54
R2 Score of testing set:0.53
```