ASSIGNMENT-3

Assignment Date	8 October 2022
Student Name	Ms. Abinaya V
Student Roll Number	192IT108
Maximum Marks	2 marks
Team ID	PNT2022TMID01939

In [1]:
```
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 StandardScaler
import statsmodels.api as sma
from statsmodels.stats.outliers_influence import variance_inflation_factor

from sklearn.linear_model import LogisticRegression
from sklearn.svm import SVC
from sklearn.neighbors import KNeighborsClassifier
from sklearn.tree import DecisionTreeClassifier
from sklearn.model_selection import cross_val_score

from sklearn.model_selection import GridSearchCV
from sklearn.metrics import classification_report
from sklearn.metrics import confusion_matrix
import warnings
```

```
warnings.filterwarnings('ignore')
```

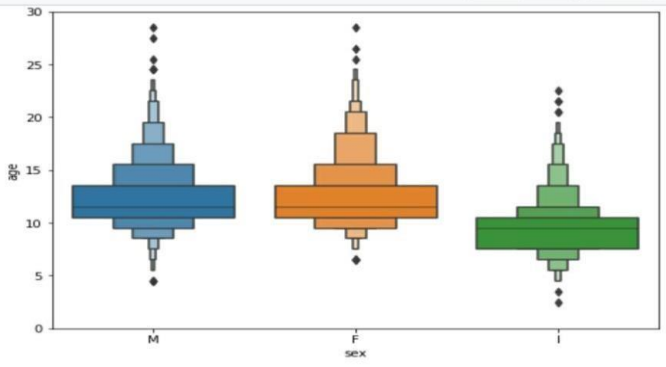
In [2]:
```
df = pd.read_csv("/content/drive/MyDrive/abalone.csv")
```

In [3]:
```
df.rename(columns={"Sex":"sex", "Length":"length", "Diameter":"diameter",
                   "Height":"height", "Whole weight":"whole_weight",
                   "Shucked weight":"shucked_weight", "Viscera weight":"viscera
                   "Shell weight":"shell_weight", "Rings":"rings"}, inplace = T
```

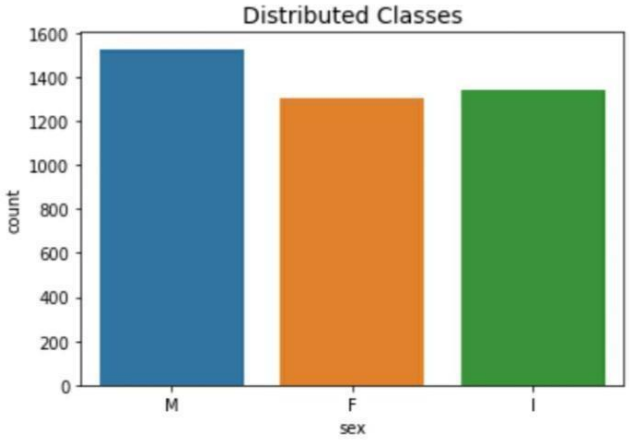
In [4]:
```
df[df['height'] == 0]  #need to drop these rows.
df.drop(index=[1257,3996], inplace = True)
df.shape
```

Out[4]:
```
(4175, 9)
```

In [5]:
```
df['age'] = df['rings']+1.5 #AS per the problem statement
df.head()
```

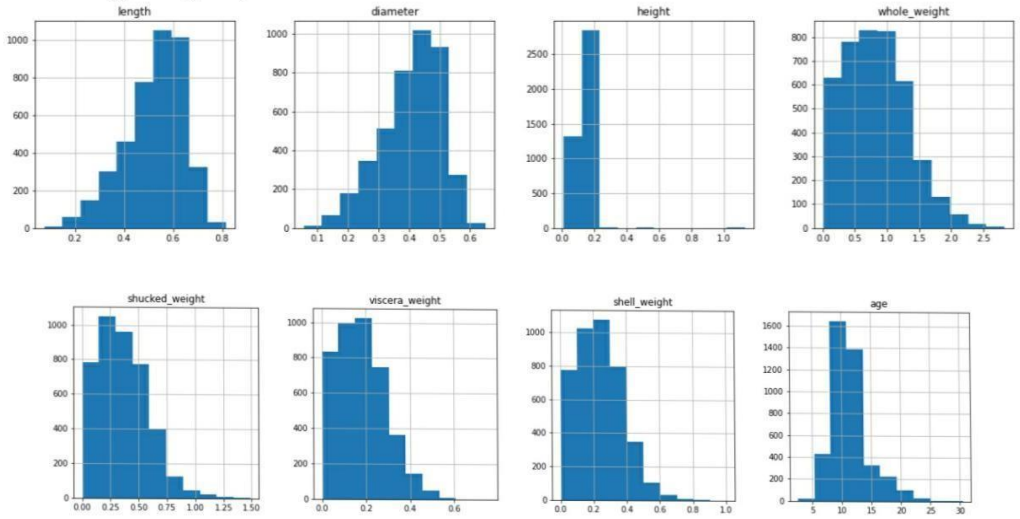


In [6]:
```
sns.countplot('sex', data=df)
plt.title('Distributed Classes', fontsize=14)
plt.show()
```



In [7]:
```
df.hist(figsize = (20,10), layout = (2,4))
```

Out[7]:
```
array([[<matplotlib.axes._subplots.AxesSubplot object at 0x7f9818f073d0>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x7f9818ebc990>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x7f9818ef3f90>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x7f9818eb55d0>],
       [<matplotlib.axes._subplots.AxesSubplot object at 0x7f9818e6dbd0>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x7f9818ecadd0>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x7f9818f850d0>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x7f9819481250>]],
      dtype=object)
```

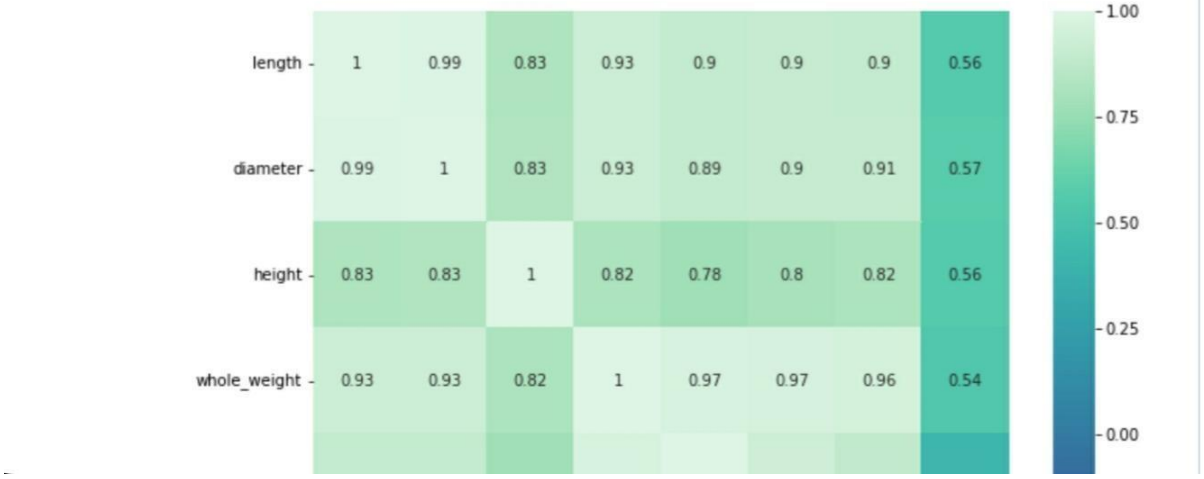


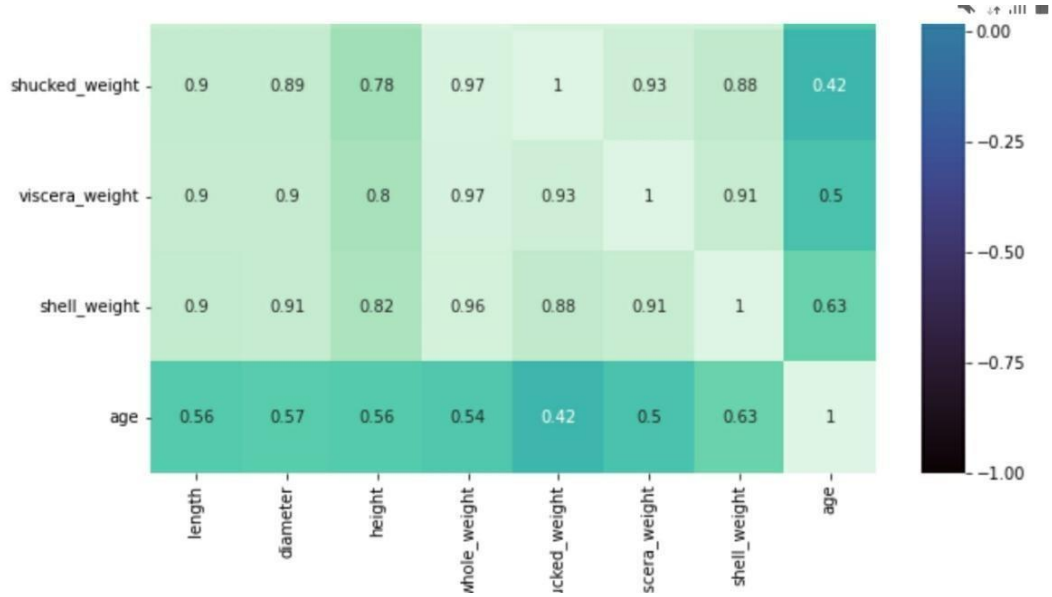
In [8]:
```
df.skew().sort_values(ascending = False)
```

Out[8]:
```
height            3.166364
age               1.113754
shucked_weight    0.718735
shell_weight      0.621081
viscera_weight    0.591455
whole_weight      0.530549
diameter         -0.610182
length           -0.640993
dtype: float64
```

In [9]:

```
corr = df.corr()
plt.figure(figsize = (10,10))
ax = sns.heatmap(corr, vmin = -1, center = 0, annot = True, cmap = 'mako')
```





In [10]:

```
upper_tri = corr.where(np.triu(np.ones(corr.shape),k=1).astype(np.bool))
columns_to_drop = [column for column in upper_tri.columns if any(upper_tri[colu

print("Columns to drop:\n", columns_to_drop)
```

```
Columns to drop:
 ['diameter', 'shucked_weight', 'viscera_weight', 'shell_weight']
```

In [11]:

```
df.head()
```

Out[11]:

	sex	length	diameter	height	whole_weight	shucked_weight	viscera_weight	shell_weight	age
0	M	0.455	0.365	0.095	0.5140	0.2245	0.1010	0.150	16.5
1	M	0.350	0.265	0.090	0.2255	0.0995	0.0485	0.070	8.5
2	F	0.530	0.420	0.135	0.6770	0.2565	0.1415	0.210	10.5
3	M	0.440	0.365	0.125	0.5160	0.2155	0.1140	0.155	11.5
4	I	0.330	0.255	0.080	0.2050	0.0895	0.0395	0.055	8.5

In [12]:
```
df.shape
```

Out[12]:
```
(4175, 9)
```

In [13]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 4175 entries, 0 to 4176
Data columns (total 9 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   sex             4175 non-null   object
 1   length          4175 non-null   float64
 2   diameter        4175 non-null   float64
 3   height          4175 non-null   float64
 4   whole_weight    4175 non-null   float64
 5   shucked_weight  4175 non-null   float64
 6   viscera_weight  4175 non-null   float64
 7   shell_weight    4175 non-null   float64
 8   age             4175 non-null   float64
dtypes: float64(8), object(1)
memory usage: 455.2+ KB
```

In [14]:
```
df[df.duplicated()]
```

Out[14]:

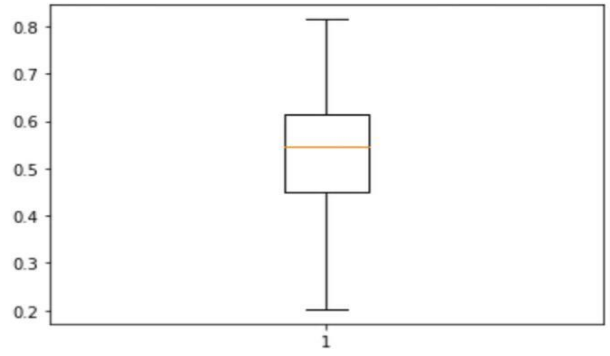
sex	length	diameter	height	whole_weight	shucked_weight	viscera_weight	shell_weight	age

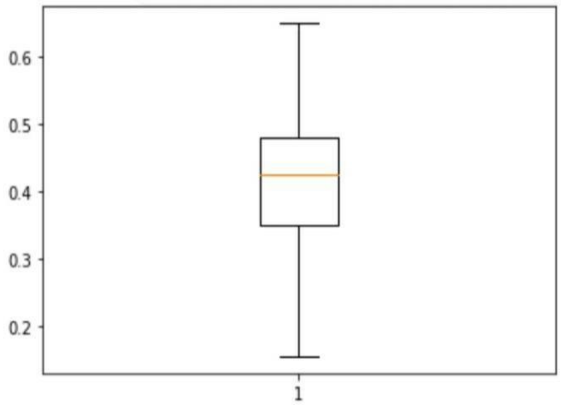
In [15]:
```
for i in df:
    if df[i].dtype=='int64' or df[i].dtypes=='float64':
        q1=df[i].quantile(0.25)
        q3=df[i].quantile(0.75)
        iqr=q3-q1
        upper=q3+1.5*iqr
        lower=q1-1.5*iqr
        df[i]=np.where(df[i] >upper, upper, df[i])
        df[i]=np.where(df[i] <lower, lower, df[i])
```

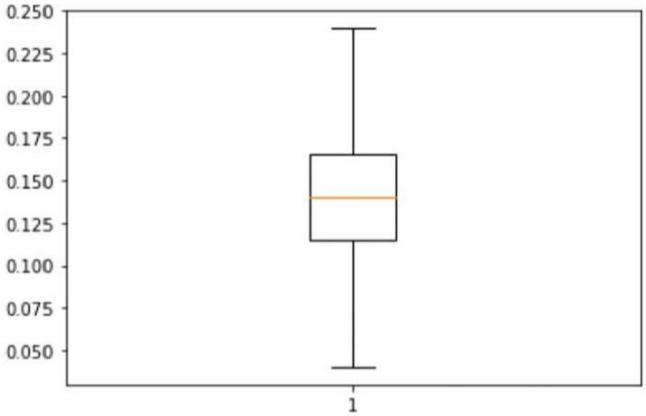
In [16]:
```
import matplotlib.pyplot as mtp
```

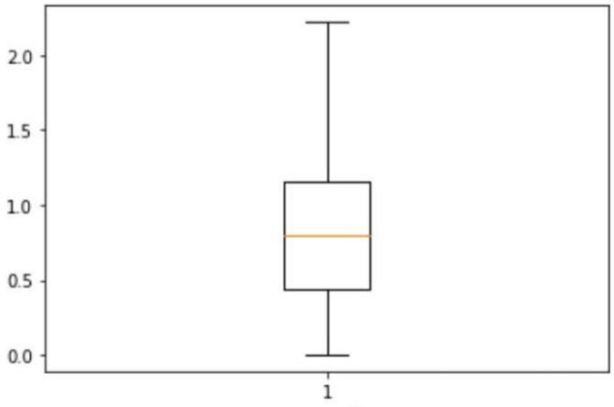
In [17]:
```
def box_scatter(data, x, y):
    fig, (ax1, ax2) = plt.subplots(nrows=2, ncols=1, figsize=(16,6))
    sns.boxplot(data=data, x=x, ax=ax1)
    sns.scatterplot(data=data, x=x,y=y,ax=ax2)
```

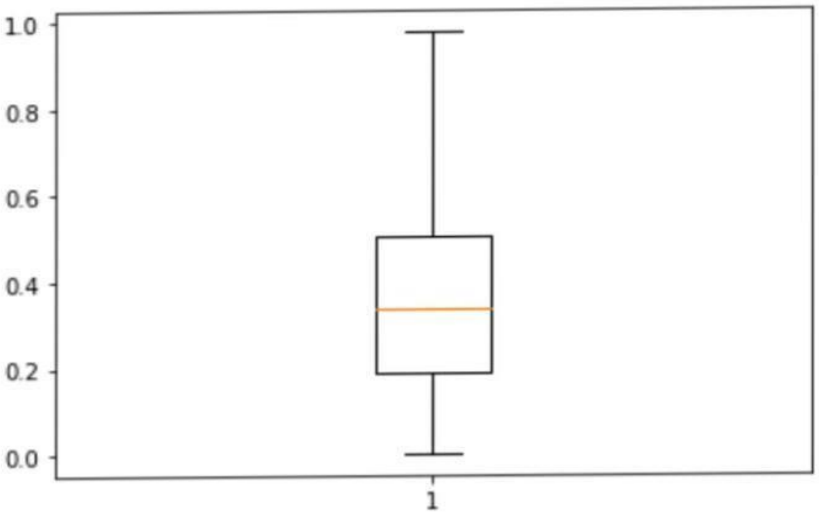
In [18]:
```
for i in df:
    if df[i].dtype=='int64' or df[i].dtypes=='float64':
        mtp.boxplot(df[i])
```

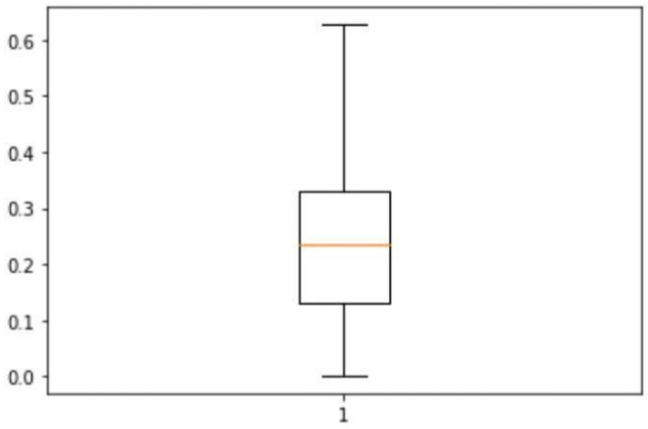


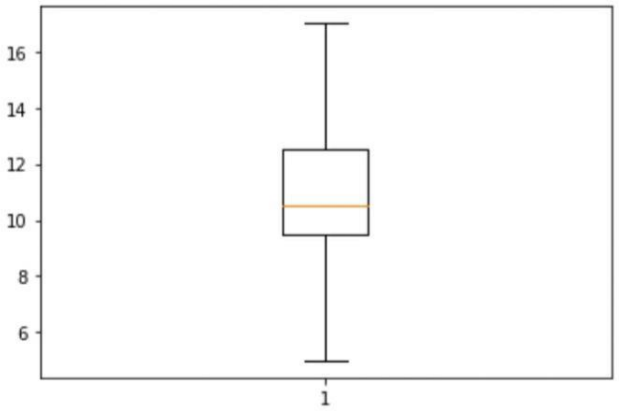

0.6
0.5
0.4
0.3
0.2
1


0.250
0.225
0.200
0.175
0.150
0.125
0.100
0.075
0.050
1


2.0
1.5
1.0
0.5
0.0
1


1.0
0.8
0.6
0.4
0.2
0.0
1





In [19]:
```
df.head()
```

Out[19]:

	sex	length	diameter	height	whole_weight	shucked_weight	viscera_weight	shell_weight	age
0	M	0.455	0.365	0.095	0.5140	0.2245	0.1010	0.150	16.5
1	M	0.350	0.265	0.090	0.2255	0.0995	0.0485	0.070	8.5
2	F	0.530	0.420	0.135	0.6770	0.2565	0.1415	0.210	10.5
3	M	0.440	0.365	0.125	0.5160	0.2155	0.1140	0.155	11.5
4	I	0.330	0.255	0.080	0.2050	0.0895	0.0395	0.055	8.5

In [20]:
```
from sklearn.preprocessing import LabelEncoder
encoder=LabelEncoder()
df['sex']=encoder.fit_transform(df['sex'])
df.head()
```

Out[20]:

	sex	length	diameter	height	whole_weight	shucked_weight	viscera_weight	shell_weight	age
0	2	0.455	0.365	0.095	0.5140	0.2245	0.1010	0.150	16.5
1	2	0.350	0.265	0.090	0.2255	0.0995	0.0485	0.070	8.5
2	0	0.530	0.420	0.135	0.6770	0.2565	0.1415	0.210	10.5
3	2	0.440	0.365	0.125	0.5160	0.2155	0.1140	0.155	11.5
4	1	0.330	0.255	0.080	0.2050	0.0895	0.0395	0.055	8.5

In [21]:
```
x=df.iloc[:,:-1]
x.head()
```

Out[21]:

	sex	length	diameter	height	whole_weight	shucked_weight	viscera_weight	shell_weight
0	2	0.455	0.365	0.095	0.5140	0.2245	0.1010	0.150
1	2	0.350	0.265	0.090	0.2255	0.0995	0.0485	0.070
2	0	0.530	0.420	0.135	0.6770	0.2565	0.1415	0.210
3	2	0.440	0.365	0.125	0.5160	0.2155	0.1140	0.155

Out[21]:

	sex	length	diameter	height	whole_weight	shucked_weight	viscera_weight	shell_weight
0	2	0.455	0.365	0.095	0.5140	0.2245	0.1010	0.150
1	2	0.350	0.265	0.090	0.2255	0.0995	0.0485	0.070
2	0	0.530	0.420	0.135	0.6770	0.2565	0.1415	0.210
3	2	0.440	0.365	0.125	0.5160	0.2155	0.1140	0.155
4	1	0.330	0.255	0.080	0.2050	0.0895	0.0395	0.055

In [24]:
```
y=df.iloc[:,-1]
y.head()
```

Out[24]:
```
0    16.5
1     8.5
2    10.5
3    11.5
4     8.5
Name: age, dtype: float64
```

In [22]:
```
from sklearn.preprocessing import StandardScaler
scaler=StandardScaler()
x=scaler.fit_transform(x)
```

In [25]:
```
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.33)
```

In [26]:
```
x_train.shape
```

Out[26]:
```
(2797, 8)
```

In [27]:
```
x_test.shape
```

Out[27]:
```
(1378, 8)
```

In [28]:
```
from sklearn.ensemble import RandomForestRegressor
reg=RandomForestRegressor()
```

In [29]:
```
reg.fit(x_train,y_train)
```

Out[29]:
```
RandomForestRegressor()
```

In [30]:
```
y_pred=reg.predict(x_test)
```

In [31]:
```
from sklearn.metrics import mean_squared_error
import math
print(math.sqrt(mean_squared_error(y_test,y_pred)))
```

```
1.8306598073341425
```