In [1]:

```
#Importing All Required Libaries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt

from warnings import filterwarnings
filterwarnings(action='ignore')
```

In [2]:

```
pd.set_option('display.max_columns',10,'display.width',1000)
train = pd.read_csv('train.csv')
test = pd.read_csv('test.csv')
train.head()
```

Out[2]:

	PassengerId	Survived	Pclass	Name	Sex	...	Parch	Ticket	Fare	Cabin	E
0	1	0	3	Braund, Mr. Owen Harris	male	...	0	A/5 21171	7.2500	NaN	
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	...	0	PC 17599	71.2833	C85	
2	3	1	3	Heikkinen, Miss. Laina	female	...	0	STON/O2. 3101282	7.9250	NaN	
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	...	0	113803	53.1000	C123	
4	5	0	3	Allen, Mr. William Henry	male	...	0	373450	8.0500	NaN	

5 rows × 12 columns

In [3]:

```
#Display shape
train.shape
```

Out[3]:

```
(891, 12)
```

In [4]:

```
test.shape
```

Out[4]:

```
(418, 11)
```

In [5]:

```
#Checking for Null values
train.isnull().sum()
```

Out[5]:

```
PassengerId      0
Survived         0
Pclass           0
Name             0
Sex              0
Age            177
SibSp            0
Parch            0
Ticket           0
Fare             0
Cabin          687
Embarked         2
dtype: int64
```

In [6]:

```
test.isnull().sum()
```

Out[6]:

```
PassengerId      0
Pclass           0
Name             0
Sex              0
Age             86
SibSp            0
Parch            0
Ticket           0
Fare             1
Cabin          327
Embarked         0
dtype: int64
```

In [7]:
```
#Description of dataset
train.describe(include="all")
```

Out[7]:

	PassengerId	Survived	Pclass	Name	Sex	...	Parch	Ticket	F
count	891.000000	891.000000	891.000000	891	891	...	891.000000	891	891.000
unique	NaN	NaN	NaN	891	2	...	NaN	681	N
top	NaN	NaN	NaN	Braund, Mr. Owen Harris	male	...	NaN	347082	N
freq	NaN	NaN	NaN	1	577	...	NaN	7	N
mean	446.000000	0.383838	2.308642	NaN	NaN	...	0.381594	NaN	32.204
std	257.353842	0.486592	0.836071	NaN	NaN	...	0.806057	NaN	49.693
min	1.000000	0.000000	1.000000	NaN	NaN	...	0.000000	NaN	0.000
25%	223.500000	0.000000	2.000000	NaN	NaN	...	0.000000	NaN	7.910
50%	446.000000	0.000000	3.000000	NaN	NaN	...	0.000000	NaN	14.454
75%	668.500000	1.000000	3.000000	NaN	NaN	...	0.000000	NaN	31.000
max	891.000000	1.000000	3.000000	NaN	NaN	...	6.000000	NaN	512.329

11 rows × 12 columns

In [8]:
```
train.groupby('Survived').mean()
```

Out[8]:

	PassengerId	Pclass	Age	SibSp	Parch	Fare
Survived						
0	447.016393	2.531876	30.626179	0.553734	0.329690	22.117887
1	444.368421	1.950292	28.343690	0.473684	0.464912	48.395408

In [9]:
```
train.corr()
```

Out[9]:

	PassengerId	Survived	Pclass	Age	SibSp	Parch	Fare
PassengerId	1.000000	-0.005007	-0.035144	0.036847	-0.057527	-0.001652	0.012658
Survived	-0.005007	1.000000	-0.338481	-0.077221	-0.035322	0.081629	0.257307
Pclass	-0.035144	-0.338481	1.000000	-0.369226	0.083081	0.018443	-0.549500
Age	0.036847	-0.077221	-0.369226	1.000000	-0.308247	-0.189119	0.096067
SibSp	-0.057527	-0.035322	0.083081	-0.308247	1.000000	0.414838	0.159651
Parch	-0.001652	0.081629	0.018443	-0.189119	0.414838	1.000000	0.216225
Fare	0.012658	0.257307	-0.549500	0.096067	0.159651	0.216225	1.000000

In [10]:

```
male_ind = len(train[train['Sex'] == 'male'])
print("No of Males in Titanic:",male_ind)
```

```
No of Males in Titanic: 577
```

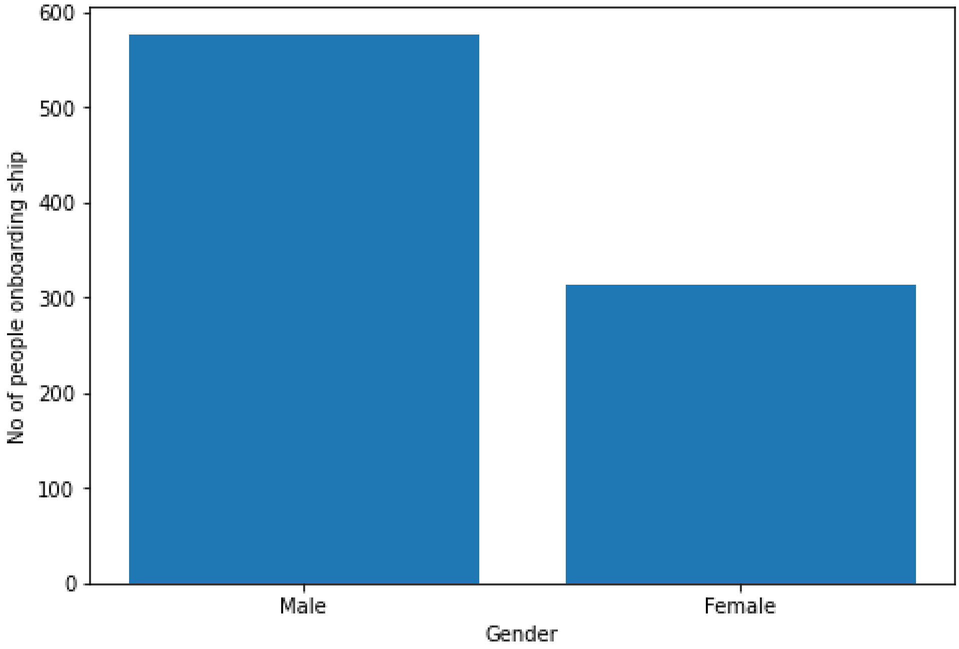
In [11]:

```
female_ind = len(train[train['Sex'] == 'female'])
print("No of Females in Titanic:",female_ind)
```

```
No of Females in Titanic: 314
```

In [12]:

```
#Plotting
fig = plt.figure()
ax = fig.add_axes([0,0,1,1])
gender = ['Male','Female']
index = [577,314]
ax.bar(gender,index)
plt.xlabel("Gender")
plt.ylabel("No of people onboarding ship")
plt.show()
```



In [13]:

```
alive = len(train[train['Survived'] == 1])
dead = len(train[train['Survived'] == 0])
```

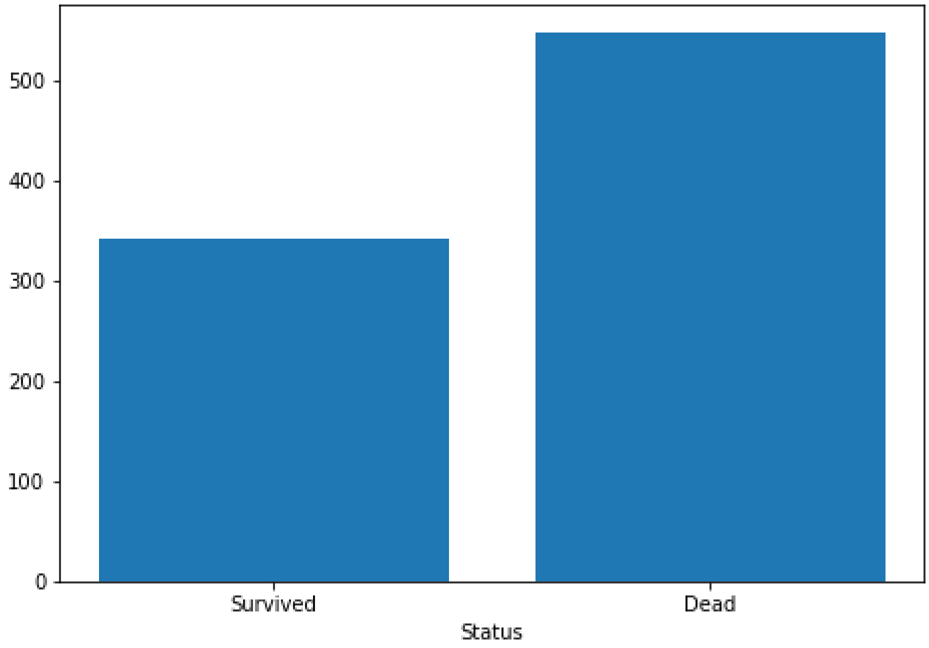
In [14]:

```
train.groupby('Sex')[['Survived']].mean()
```

Out[14]:

	Survived
Sex	
female	0.742038
male	0.188908

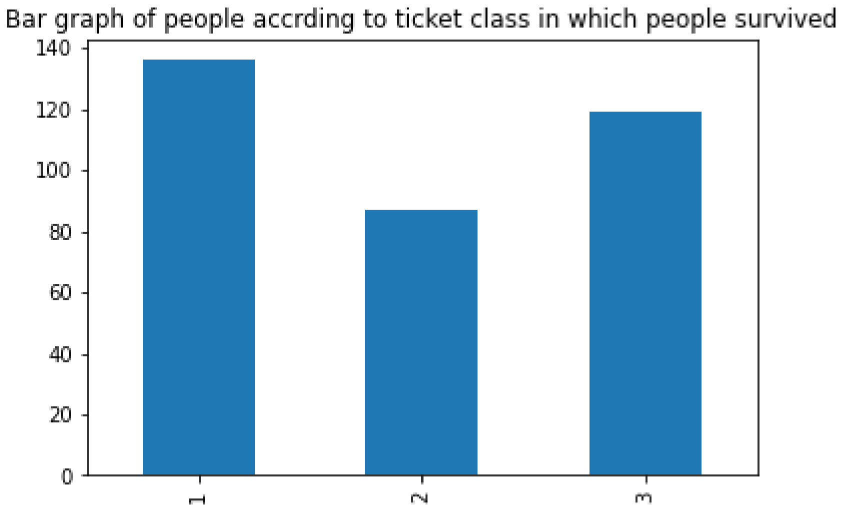
```
In [15]: fig = plt.figure()
         ax = fig.add_axes([0,0,1,1])
         status = ['Survived','Dead']
         ind = [alive,dead]
         ax.bar(status,ind)
         plt.xlabel("Status")
         plt.show()
```

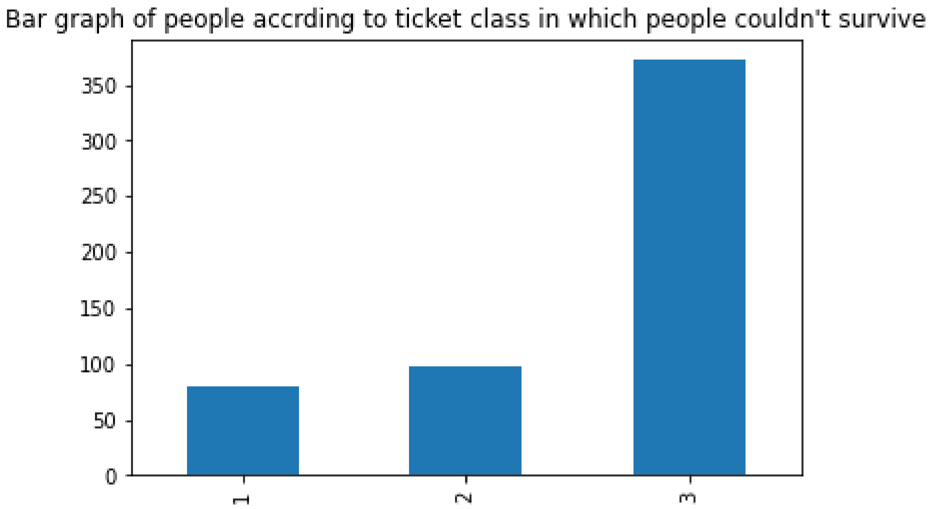


In [16]:
```
plt.figure(1)
train.loc[train['Survived'] == 1, 'Pclass'].value_counts().sort_index().plo
plt.title('Bar graph of people accrding to ticket class in which people sur


plt.figure(2)
train.loc[train['Survived'] == 0, 'Pclass'].value_counts().sort_index().plo
plt.title('Bar graph of people accrding to ticket class in which people cou
```

Out[16]:
```
Text(0.5, 1.0, "Bar graph of people accrding to ticket class in which peop
le couldn't survive")
```





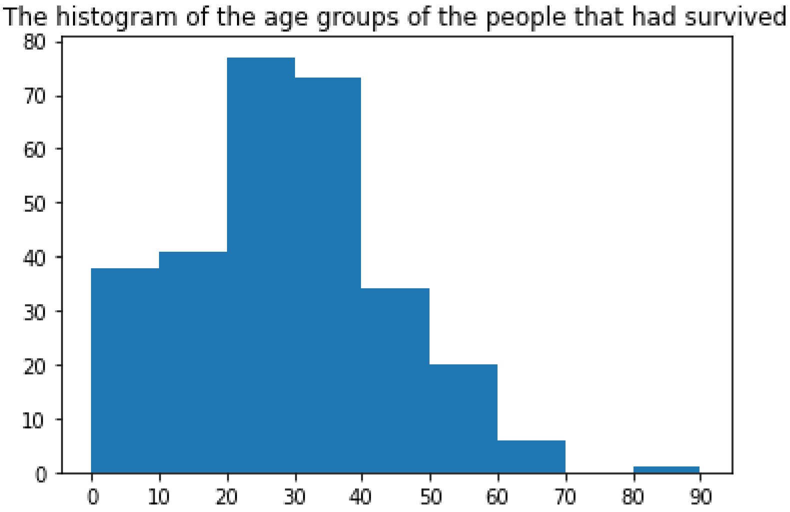
In [17]:

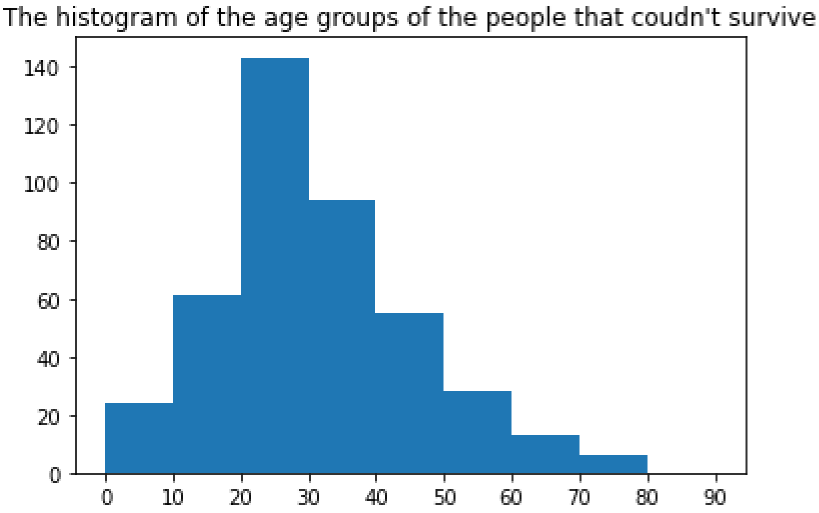
```
plt.figure(1)
age  = train.loc[train.Survived == 1, 'Age']
plt.title('The histogram of the age groups of the people that had survived'
plt.hist(age, np.arange(0,100,10))
plt.xticks(np.arange(0,100,10))


plt.figure(2)
age  = train.loc[train.Survived == 0, 'Age']
plt.title('The histogram of the age groups of the people that coudn\'t surv
plt.hist(age, np.arange(0,100,10))
plt.xticks(np.arange(0,100,10))
```

Out[17]:

```
([<matplotlib.axis.XTick at 0x2273ddc3220>,
  <matplotlib.axis.XTick at 0x2273ddc31f0>,
  <matplotlib.axis.XTick at 0x2273df3ff40>,
  <matplotlib.axis.XTick at 0x2273d6f9b80>,
  <matplotlib.axis.XTick at 0x2273d6f92e0>,
  <matplotlib.axis.XTick at 0x2273d67b9d0>,
  <matplotlib.axis.XTick at 0x2273d67bbe0>,
  <matplotlib.axis.XTick at 0x2273e0057f0>,
  <matplotlib.axis.XTick at 0x2273df32310>,
  <matplotlib.axis.XTick at 0x2273df323d0>],
 [Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, '')])
```





The histogram of the age groups of the people that coudn't survive

In [18]:
```
train[["SibSp", "Survived"]].groupby(['SibSp'], as_index=False).mean().sort
```

Out[18]:

	SibSp	Survived
1	1	0.535885
2	2	0.464286
0	0	0.345395
3	3	0.250000
4	4	0.166667
5	5	0.000000
6	8	0.000000

In [19]:
```
train[["Pclass", "Survived"]].groupby(['Pclass'], as_index=False).mean().so
```

Out[19]:

	Pclass	Survived
0	1	0.629630
1	2	0.472826
2	3	0.242363

In [20]:

```
train[["Age", "Survived"]].groupby(['Age'], as_index=False).mean().sort_val
```

Out[20]:

```
      Age  Survived
 0   0.42       1.0
 1   0.67       1.0
 2   0.75       1.0
 3   0.83       1.0
 4   0.92       1.0
...   ...       ...
83  70.00       0.0
84  70.50       0.0
85  71.00       0.0
86  74.00       0.0
87  80.00       1.0

88 rows × 2 columns
```

In [21]:

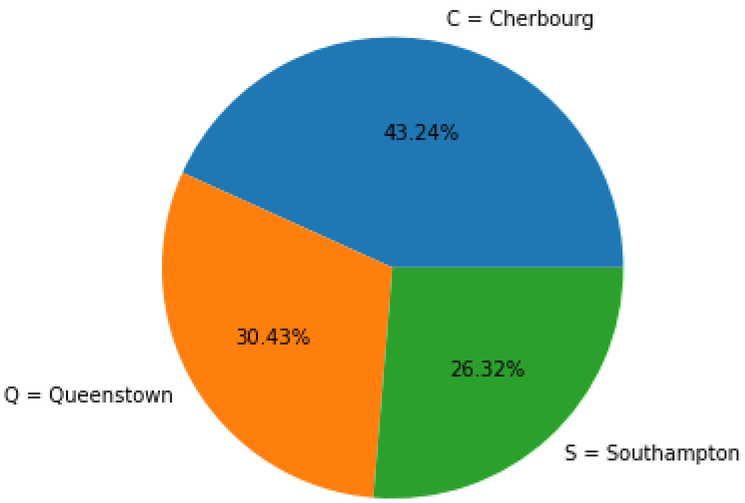
```
train[["Embarked", "Survived"]].groupby(['Embarked'], as_index=False).mean(
```

Out[21]:

```
  Embarked  Survived
0        C  0.553571
1        Q  0.389610
2        S  0.336957
```

In [22]:

```
fig = plt.figure()
ax = fig.add_axes([0,0,1,1])
ax.axis('equal')
l = ['C = Cherbourg', 'Q = Queenstown', 'S = Southampton']
s = [0.553571,0.389610,0.336957]
ax.pie(s, labels = l,autopct='%1.2f%%')
plt.show()
```



In [23]:

```
test.describe(include="all")
```

Out[23]:

	PassengerId	Pclass	Name	Sex	Age	...	Parch	Ticket	Far
count	418.000000	418.000000	418	418	332.000000	...	418.000000	418	417.00000
unique	NaN	NaN	418	2	NaN	...	NaN	363	Nal
top	NaN	NaN	Kelly, Mr. James	male	NaN	...	NaN	PC 17608	Nal
freq	NaN	NaN	1	266	NaN	...	NaN	5	Nal
mean	1100.500000	2.265550	NaN	NaN	30.272590	...	0.392344	NaN	35.62718
std	120.810458	0.841838	NaN	NaN	14.181209	...	0.981429	NaN	55.90757
min	892.000000	1.000000	NaN	NaN	0.170000	...	0.000000	NaN	0.00000
25%	996.250000	1.000000	NaN	NaN	21.000000	...	0.000000	NaN	7.89580
50%	1100.500000	3.000000	NaN	NaN	27.000000	...	0.000000	NaN	14.45420
75%	1204.750000	3.000000	NaN	NaN	39.000000	...	0.000000	NaN	31.50000
max	1309.000000	3.000000	NaN	NaN	76.000000	...	9.000000	NaN	512.32920

11 rows × 11 columns

In [24]:

```
#Droping Useless Columns
train = train.drop(['Ticket'], axis = 1)
test = test.drop(['Ticket'], axis = 1)
```

In [25]:

```
train = train.drop(['Cabin'], axis = 1)
test = test.drop(['Cabin'], axis = 1)
```

In [26]:

```
train = train.drop(['Name'], axis = 1)
test = test.drop(['Name'], axis = 1)
```

In [27]:

```
#Feature Selection
column_train=['Age','Pclass','SibSp','Parch','Fare','Sex','Embarked']
#training values
X=train[column_train]
#target value
Y=train['Survived']
```

In [28]:

```
X['Age'].isnull().sum()
X['Pclass'].isnull().sum()
X['SibSp'].isnull().sum()
X['Parch'].isnull().sum()
X['Fare'].isnull().sum()
X['Sex'].isnull().sum()
X['Embarked'].isnull().sum()
```

Out[28]:

```
2
```

In [29]:

```
X['Age']=X['Age'].fillna(X['Age'].median())
X['Age'].isnull().sum()
```

Out[29]:

```
0
```

In [30]:

```
X['Embarked'] = train['Embarked'].fillna(method ='pad')
X['Embarked'].isnull().sum()
```

Out[30]:

```
0
```

In [31]:

```
d={'male':0, 'female':1}
X['Sex']=X['Sex'].apply(lambda x:d[x])
X['Sex'].head()
```

Out[31]:

```
0    0
1    1
2    1
3    1
4    0
Name: Sex, dtype: int64
```

In [32]:

```
e={'C':0, 'Q':1 ,'S':2}
X['Embarked']=X['Embarked'].apply(lambda x:e[x])
X['Embarked'].head()
```

Out[32]:

```
0    2
1    0
2    2
3    2
4    2
Name: Embarked, dtype: int64
```

In [33]:

```
from sklearn.model_selection import train_test_split
X_train, X_test, Y_train, Y_test = train_test_split(X,Y,test_size=0.3,rando
```

In [34]:

```
from sklearn.linear_model import LogisticRegression
model = LogisticRegression()
model.fit(X_train,Y_train)
Y_pred = model.predict(X_test)

from sklearn.metrics import accuracy_score
print("Accuracy Score:",accuracy_score(Y_test,Y_pred))
```

```
Accuracy Score: 0.7574626865671642
```

In [35]:

```
from sklearn.metrics import accuracy_score,confusion_matrix
confusion_mat = confusion_matrix(Y_test,Y_pred)
print(confusion_mat)
```

```
[[130  26]
 [ 39  73]]
```

In [36]:

```
from sklearn.svm import SVC
model1 = SVC()
model1.fit(X_train,Y_train)

pred_y = model1.predict(X_test)

from sklearn.metrics import accuracy_score
print("Acc=",accuracy_score(Y_test,pred_y))
```

```
Acc= 0.6604477611940298
```

In [37]:

```
from sklearn.metrics import accuracy_score,confusion_matrix,classification_
confusion_mat = confusion_matrix(Y_test,pred_y)
print(confusion_mat)
print(classification_report(Y_test,pred_y))
```

```
[[149   7]
 [ 84  28]]
              precision    recall  f1-score   support

           0       0.64      0.96      0.77       156
           1       0.80      0.25      0.38       112

    accuracy                           0.66       268
   macro avg       0.72      0.60      0.57       268
weighted avg       0.71      0.66      0.61       268
```

In [38]:

```
from sklearn.neighbors import KNeighborsClassifier
model2 = KNeighborsClassifier(n_neighbors=5)
model2.fit(X_train,Y_train)
y_pred2 = model2.predict(X_test)

from sklearn.metrics import accuracy_score
print("Accuracy Score:",accuracy_score(Y_test,y_pred2))
```

```
Accuracy Score: 0.6604477611940298
```

In [39]:

```
from sklearn.metrics import accuracy_score,confusion_matrix,classification_
confusion_mat = confusion_matrix(Y_test,y_pred2)
print(confusion_mat)
print(classification_report(Y_test,y_pred2))
```

```
[[127  29]
 [ 62  50]]
              precision    recall  f1-score   support

           0       0.67      0.81      0.74       156
           1       0.63      0.45      0.52       112

    accuracy                           0.66       268
   macro avg       0.65      0.63      0.63       268
weighted avg       0.66      0.66      0.65       268
```

In [40]:

```
from sklearn.naive_bayes import GaussianNB
model3 = GaussianNB()
model3.fit(X_train,Y_train)
y_pred3 = model3.predict(X_test)

from sklearn.metrics import accuracy_score
print("Accuracy Score:",accuracy_score(Y_test,y_pred3))
```

```
Accuracy Score: 0.7686567164179104
```

In [41]:

```
from sklearn.metrics import accuracy_score,confusion_matrix,classification_
confusion_mat = confusion_matrix(Y_test,y_pred3)
print(confusion_mat)
print(classification_report(Y_test,y_pred3))
```

```
[[129  27]
 [ 35  77]]
              precision    recall  f1-score   support

           0       0.79      0.83      0.81       156
           1       0.74      0.69      0.71       112

    accuracy                           0.77       268
   macro avg       0.76      0.76      0.76       268
weighted avg       0.77      0.77      0.77       268
```

In [42]:

```
from sklearn.tree import DecisionTreeClassifier
model4 = DecisionTreeClassifier(criterion='entropy',random_state=7)
model4.fit(X_train,Y_train)
y_pred4 = model4.predict(X_test)

from sklearn.metrics import accuracy_score
print("Accuracy Score:",accuracy_score(Y_test,y_pred4))
```

```
Accuracy Score: 0.7425373134328358
```

In [43]:

```
from sklearn.metrics import accuracy_score,confusion_matrix,classification_
confusion_mat = confusion_matrix(Y_test,y_pred4)
print(confusion_mat)
print(classification_report(Y_test,y_pred4))
```

```
[[132  24]
 [ 45  67]]
              precision    recall  f1-score   support

           0       0.75      0.85      0.79       156
           1       0.74      0.60      0.66       112

    accuracy                           0.74       268
   macro avg       0.74      0.72      0.73       268
weighted avg       0.74      0.74      0.74       268
```

In [44]:

```
results = pd.DataFrame({
    'Model': ['Logistic Regression','Support Vector Machines', 'Naive Bayes
    'Score': [0.75,0.66,0.76,0.66,0.74]})

result_df = results.sort_values(by='Score', ascending=False)
result_df = result_df.set_index('Score')
result_df.head(9)
```

Out[44]:

	Model
Score	
0.76	Naive Bayes
0.75	Logistic Regression
0.74	Decision Tree
0.66	Support Vector Machines
0.66	KNN

In [ ]:

```
```