Question 3 - Part B

Probabilistic Supervised Learning - Naive Bayes(Binomial): Create a dataset from the sample given to you(e.g. “Titanic, Play Tennis Probability”, “Shopper Buying Probability” etc.). Perform the necessary pre-processing steps such as encoding. Train the model using Naive Bayes Classifier for Binomial predictions. Give new test data and predict the classification output. Handcode the classification probability and compare with the model output. Analyze and write the inference.

Kagle Titanic dataset

In [1]:

```
import pandas as pd
#Import dataset
df = pd.read_csv('titanic.csv')
df.head(2)
```

Out[1]:

	Survived	Pclass	Name	Sex	Age	Siblings/Spouses Aboard	Parents/Children Aboard	Fare
0	0	3	Mr. Owen Harris Braund	male	22.0	1	0	7.2500
1	1	1	Mrs. John Bradley (Florence Briggs Thayer) Cum...	female	38.0	1	0	71.2833

In [2]:

```
#Drop extra things
df.dropna()
df.drop(['Name',],inplace=True,axis=1)
df.head(2)
```

Out[2]:

	Survived	Pclass	Sex	Age	Siblings/Spouses Aboard	Parents/Children Aboard	Fare
0	0	3	male	22.0	1	0	7.2500
1	1	1	female	38.0	1	0	71.2833

In [3]:

```
#Encoding text to numbers
from sklearn.preprocessing import LabelEncoder,StandardScaler
encoder = LabelEncoder()
df['Sex']=encoder.fit_transform(df['Sex'])
#Using scaler to standardize the mean and variance
scaler = StandardScaler()
df[['Fare','Age']] = scaler.fit_transform(df[['Fare','Age']])
df.head(3)
```

Out[3]:

	Survived	Pclass	Sex	Age	Siblings/Spouses Aboard	Parents/Children Aboard	Fare
0	0	3	1	-0.529366	1	0	-0.503586
1	1	1	0	0.604265	1	0	0.783412
2	1	3	0	-0.245958	0	0	-0.490020

In [4]:

```
#Training model
from sklearn.naive_bayes import BernoulliNB
from sklearn.model_selection import train_test_split
#Train test split
x_train,x_test,y_train,y_test=train_test_split(df.drop(['Survived'],axis=1),df['
model =BernoulliNB()
model.fit(x_train,y_train)
#Listing classes
model.classes_
```

Out[4]:

```
array([0, 1], dtype=int64)
```

In [5]:

```
#Prediction and calculate accuracy
y_pred=model.predict(x_test)

from sklearn.metrics import confusion_matrix,accuracy_score,f1_score
acc =  accuracy_score(y_pred,y_test)
f1 = f1_score(y_pred,y_test)

print("Accuracy : ",acc,"\nF1 Score : ",f1)
```

```
Accuracy :  0.7584269662921348
F1 Score :  0.6559999999999999
```

In [6]:

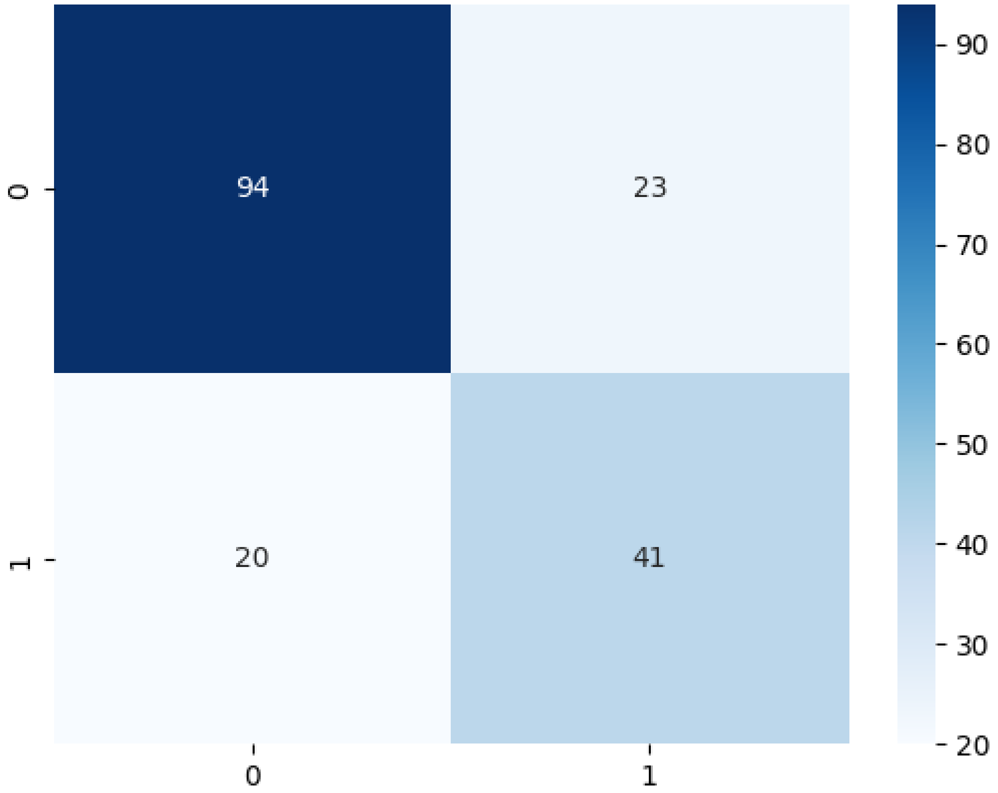
```
#Draw confusion matrix
print(y_test.shape)
labels = [0,1]
cm=confusion_matrix(y_pred,y_test,labels=labels)

import seaborn as sns
sns.heatmap(cm,annot=True,cmap='Blues')
```

```
(178,)
```

Out[6]:

```
<AxesSubplot: >
```



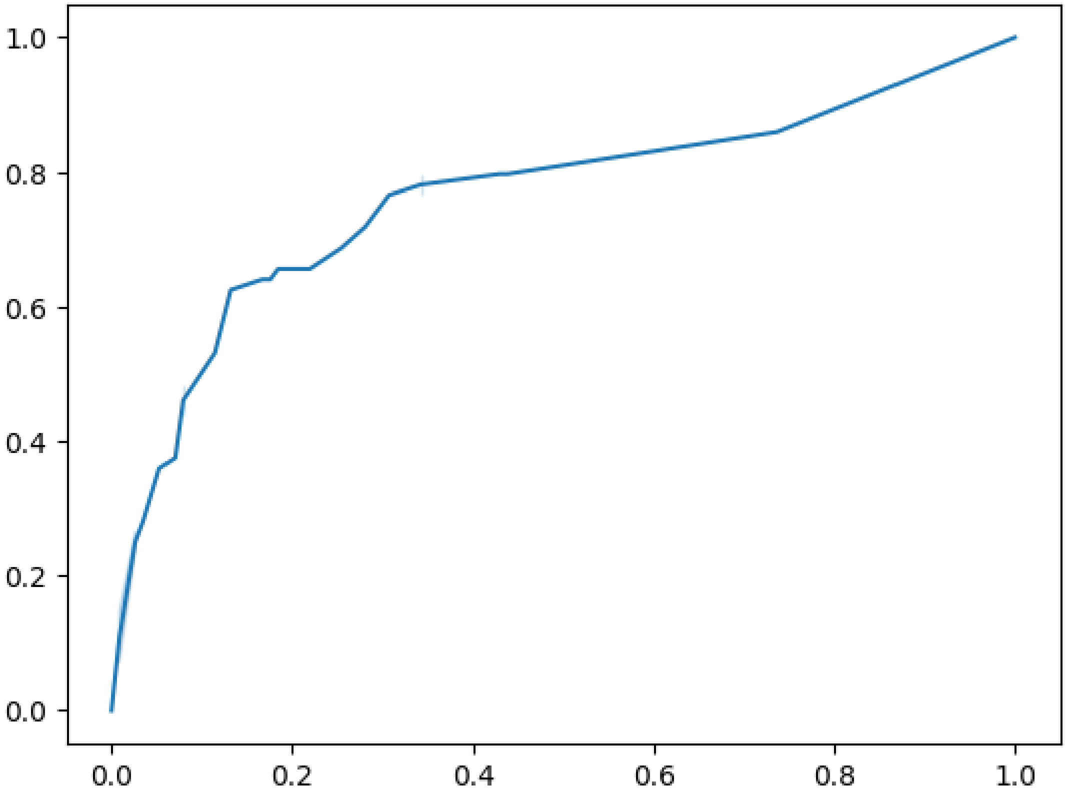
In [7]:

```
from sklearn.metrics import roc_curve,auc
prob=model.predict_proba(x_test)
prob=prob[:,1]
fpr,tpr,_=roc_curve(y_test,prob)
print("AUC",auc(fpr,tpr))
print("ROC curve")
sns.lineplot(x=fpr,y=tpr)
```

```
AUC 0.7633634868421053
ROC curve
```

Out[7]:

```
<AxesSubplot: >
```


1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0