In [46]:
```python
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
import numpy as np
%matplotlib inline
```

Importing Data

In [47]:
```python
df = pd.read_csv("C:\\Users\\abhishek ambawale\\Downloads\\titanic_train.csv")
df.head()
```

Out[47]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500	NaN	S
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2833	C85	C
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9250	NaN	S
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1000	C123	S
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	NaN	S

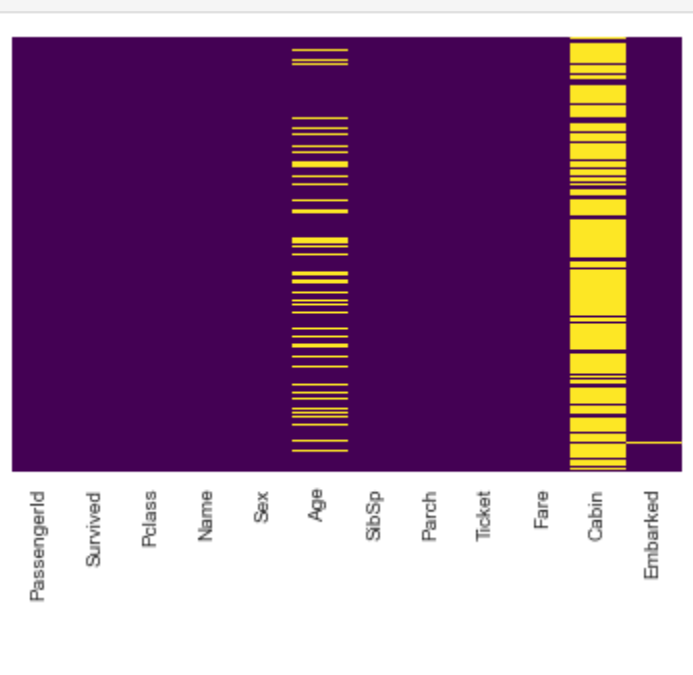
In [48]:
```python
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
Data columns (total 12 columns):
 #   Column       Non-Null Count  Dtype
---  ------       --------------  -----
 0   PassengerId  891 non-null    int64
 1   Survived     891 non-null    int64
 2   Pclass       891 non-null    int64
 3   Name         891 non-null    object
 4   Sex          891 non-null    object
 5   Age          714 non-null    float64
 6   SibSp        891 non-null    int64
 7   Parch        891 non-null    int64
 8   Ticket       891 non-null    object
 9   Fare         891 non-null    float64
 10  Cabin        204 non-null    object
 11  Embarked     889 non-null    object
dtypes: float64(2), int64(5), object(5)
memory usage: 83.7+ KB
```

In [49]:
```python
df.isnull().sum()
```

Out[49]:
```
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 [50]:
```python
sns.heatmap(df.isnull(),yticklabels=False,cbar=False,cmap='viridis');
```



Data Cleaning

Few conclusions

1. Missing values in Age, Cabin and Embarked columns
2. More than 70 percent values are missing in cabin columns, will have to drop
3. Few columns have inappropriate data types

In [51]:
```python
# Dropping cabin column

df.drop(columns=['Cabin'],inplace=True)
```

In [52]:
```python
# Imputing missing values in age with mean of age.

df['Age'].fillna(df['Age'].mean(),inplace=True)
```

In [53]:
```python
# Imputing missing values for embarked

# finding the most appeared value in embarked column

df['Embarked'].value_counts()
```

Out[53]:
```
S    644
C    168
Q     77
Name: Embarked, dtype: int64
```

In [54]:
```python
# S it is

df['Embarked'].fillna('S', inplace=True)
```

Changing data type for the following columns.

Survived(category) PClass(category) Sex(category) Age(int) Embarked(category)

In [55]:
```python
df['Survived']=df['Survived'].astype('category')
df['Pclass']=df['Pclass'].astype('category')
df['Sex']=df['Sex'].astype('category')
df['Age']=df['Age'].astype('int')
df['Embarked']=df['Embarked'].astype('category')
```

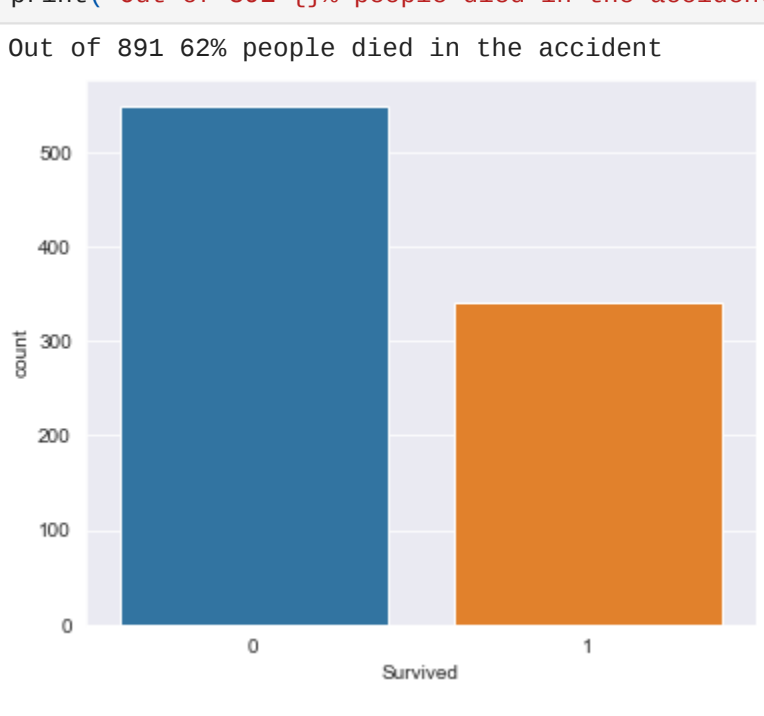
In [56]:
```python
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
Data columns (total 11 columns):
 #   Column       Non-Null Count  Dtype
---  ------       --------------  -----
 0   PassengerId  891 non-null    int64
 1   Survived     891 non-null    category
 2   Pclass       891 non-null    category
 3   Name         891 non-null    object
 4   Sex          891 non-null    category
 5   Age          891 non-null    int32
 6   SibSp        891 non-null    int64
 7   Parch        891 non-null    int64
 8   Ticket       891 non-null    object
 9   Fare         891 non-null    float64
 10  Embarked     891 non-null    category
dtypes: category(4), float64(1), int32(1), int64(3), object(2)
memory usage: 49.4+ KB
```

EDA

In [57]:
```python
plt.figure(figsize=(6,5))
sns.set_style('darkgrid')
sns.countplot(x='Survived',data=df);
death_percent=round((df['Survived'].value_counts().values[0]/891)*100)

print("Out of 891 {}% people died in the accident".format(death_percent))
```

```
Out of 891 62% people died in the accident
```



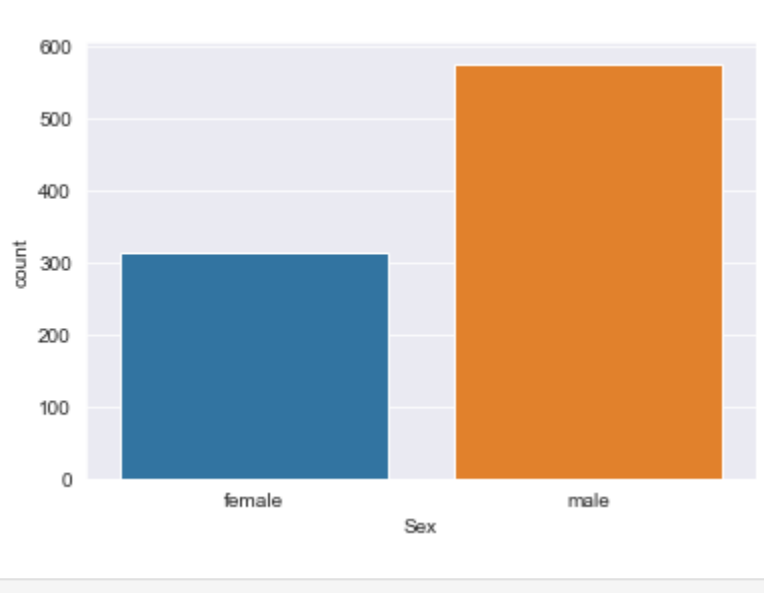
Survival based on male and female.

In [58]:
```python
print((df['Sex'].value_counts()/891)*100)

sns.countplot(df['Sex'])
```

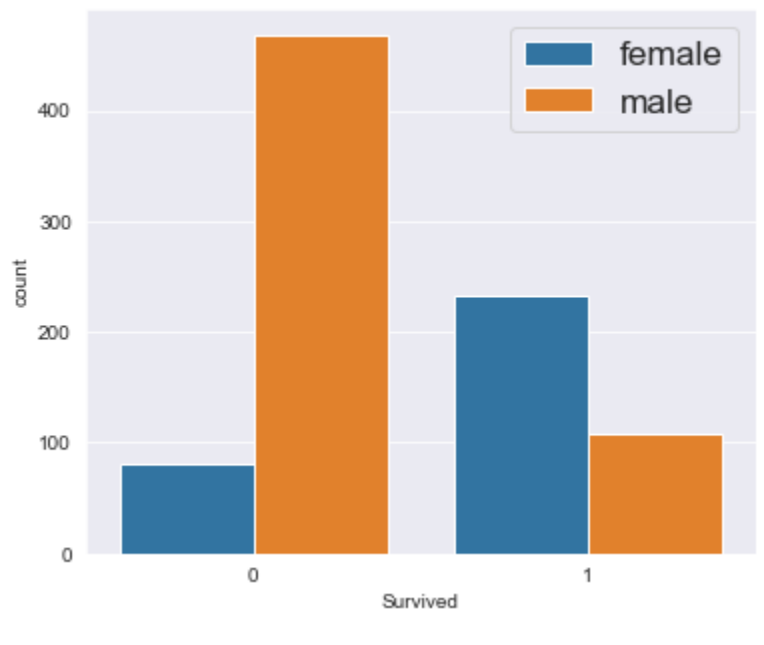
```
male      64.758698
female    35.241302
Name: Sex, dtype: float64
```

```
C:\Users\abhishek ambawale\anaconda3\lib\site-packages\seaborn\_decorators.py:36: FutureWarning: Pass the following variable as a keyword arg: x. From version 0.12, the only valid positional argument will be `data`, and passing other arguments without an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
```

Out[58]:
```
<AxesSubplot:xlabel='Sex', ylabel='count'>
```



In [59]:
```python
plt.figure(figsize=(6,5))
sns.set_style('darkgrid')
sns.countplot(x='Survived',hue='Sex',data=df)
plt.legend(fontsize='xx-large');
```



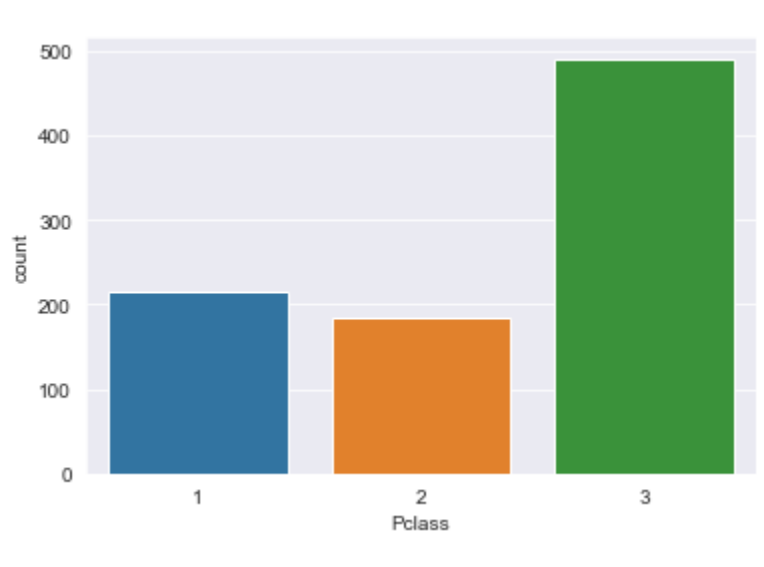
Survival based on Pclass.

In [60]:
```python
# Pclass column

print((df['Pclass'].value_counts()/891)*100)

sns.countplot(df['Pclass'])

# Conclusion : Pclass 3 was the most crowded class
```

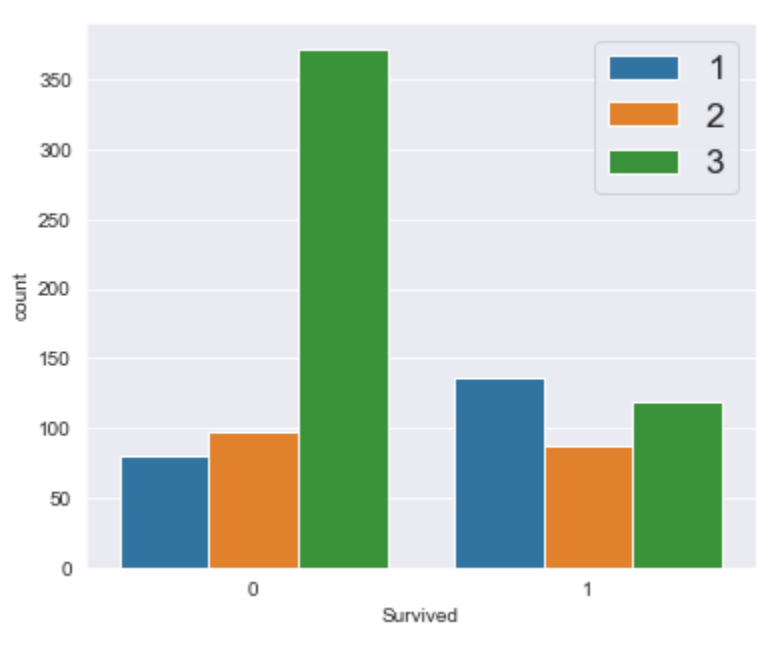
```
3    55.106622
1    24.242424
2    20.650954
Name: Pclass, dtype: float64
```

```
C:\Users\abhishek ambawale\anaconda3\lib\site-packages\seaborn\_decorators.py:36: FutureWarning: Pass the following variable as a keyword arg: x. From version 0.12, the only valid positional argument will be `data`, and passing other arguments without an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
```

Out[60]:
```
<AxesSubplot:xlabel='Pclass', ylabel='count'>
```



In [61]:
```python
plt.figure(figsize=(6,5))
sns.set_style('darkgrid')
sns.countplot(x='Survived',hue='Pclass',data=df)
plt.legend(fontsize='xx-large');
```



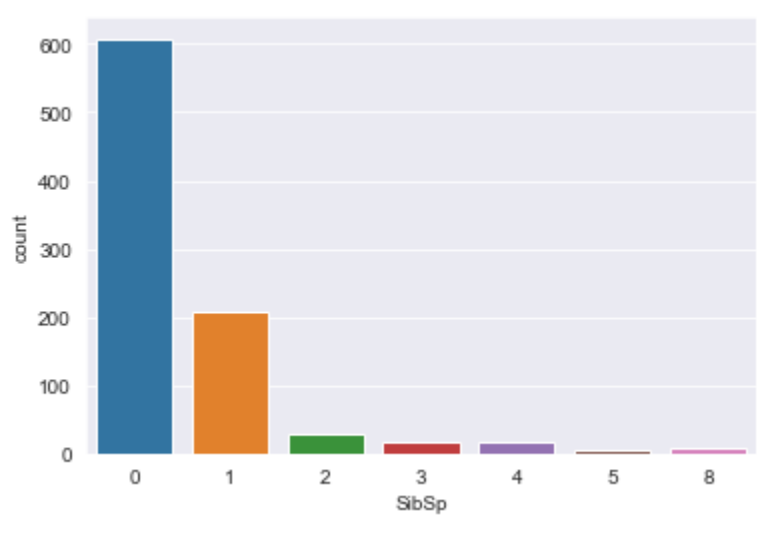
Countplot of family.

In [62]:
```python
print(df['SibSp'].value_counts())

sns.countplot(df['SibSp'])
```

```
0    608
1    209
2     28
4     18
3     16
8      7
5      5
Name: SibSp, dtype: int64
```

```
C:\Users\abhishek ambawale\anaconda3\lib\site-packages\seaborn\_decorators.py:36: FutureWarning: Pass the following variable as a keyword arg: x. From version 0.12, the only valid positional argument will be `data`, and passing other arguments without an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
```

Out[62]:
```
<AxesSubplot:xlabel='SibSp', ylabel='count'>
```



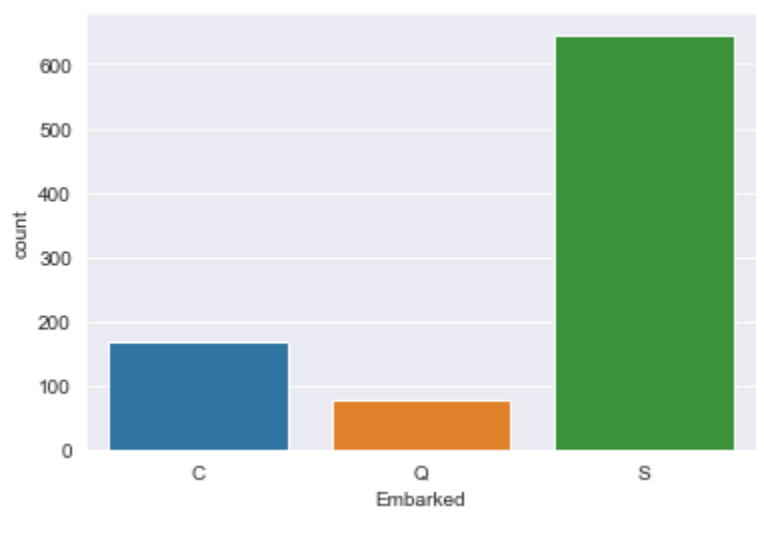
Survival based on Embarked.

In [63]:
```python
print((df['Embarked'].value_counts()/891)*100)

sns.countplot(df['Embarked'])
```

```
S    72.502806
C    18.855219
Q     8.641975
Name: Embarked, dtype: float64
```

```
C:\Users\abhishek ambawale\anaconda3\lib\site-packages\seaborn\_decorators.py:36: FutureWarning: Pass the following variable as a keyword arg: x. From version 0.12, the only valid positional argument will be `data`, and passing other arguments without an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
```

Out[63]:
```
<AxesSubplot:xlabel='Embarked', ylabel='count'>
```

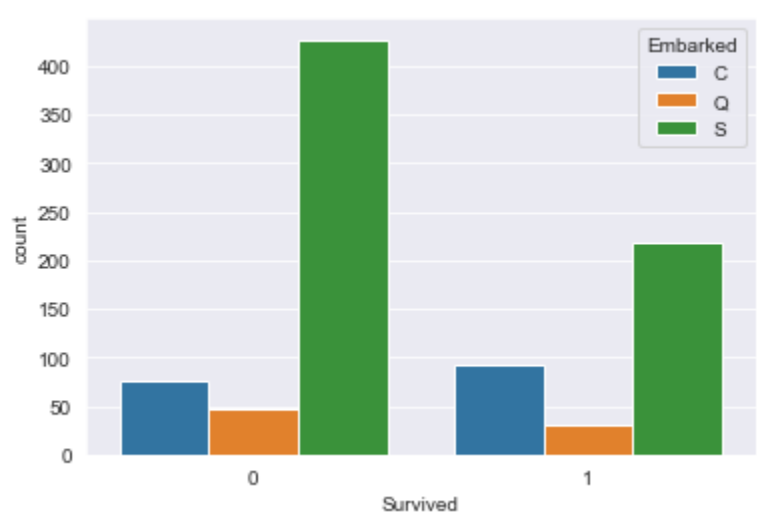


In [64]:
```python
sns.countplot(df['Survived'], hue=df['Embarked'])

pd.crosstab(df['Embarked'], df['Survived']).apply(lambda r: round((r/r.sum())*100,1), axis=1)
```

```
C:\Users\abhishek ambawale\anaconda3\lib\site-packages\seaborn\_decorators.py:36: FutureWarning: Pass the following variable as a keyword arg: x. From version 0.12, the only valid positional argument will be `data`, and passing other arguments without an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
```

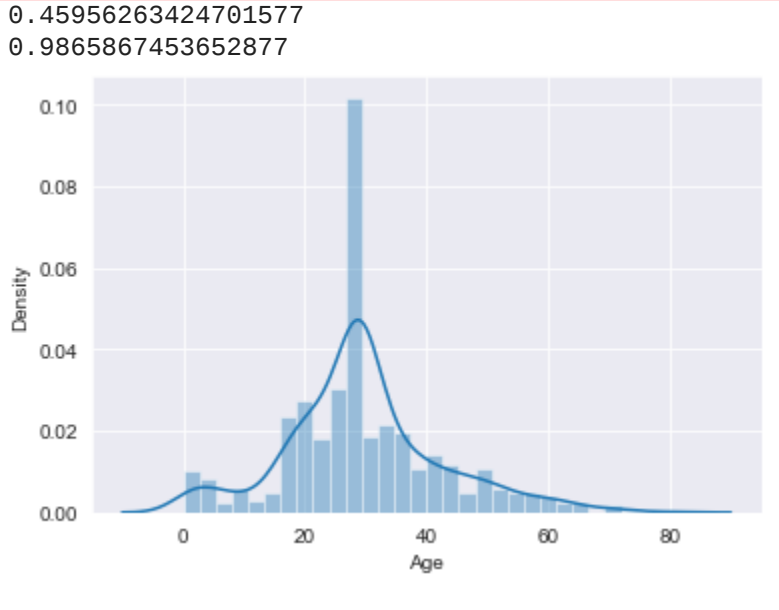
Out[64]:

Survived	0	1
Embarked		
C	44.6	55.4
Q	61.0	39.0
S	66.1	33.9



In [65]:
```python
# Age column

sns.distplot(df['Age'])

print(df['Age'].skew())

print(df['Age'].kurt())
```

```
C:\Users\abhishek ambawale\anaconda3\lib\site-packages\seaborn\distributions.py:2619: FutureWarning: `distplot` is a deprecated function and will be removed in a future version. Pl
ease adapt your code to use either `displot` (a figure-level function with similar flexibility) or `histplot` (an axes-level function for histograms).
  warnings.warn(msg, FutureWarning)
0.45956263424701577
0.9865867453652877
```



In [66]:
```python
embark =pd.get_dummies(df['Embarked'],drop_first=True)
sex = pd.get_dummies(df['Sex'],drop_first=True)
```

In [67]:
```python
df.head(5)
```

Out[67]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Embarked
0	1	0	3	Braund, Mr. Owen Harris	male	22	1	0	A/5 21171	7.2500	S
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38	1	0	PC 17599	71.2833	C
2	3	1	3	Heikkinen, Miss. Laina	female	26	0	0	STON/O2. 3101282	7.9250	S
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35	1	0	113803	53.1000	S
4	5	0	3	Allen, Mr. William Henry	male	35	0	0	373450	8.0500	S

In [68]:
```python
df.drop(columns=['Name','Sex','Embarked','Ticket'],axis=1,inplace=True)
```

In [69]:
```python
df.head()
```

Out[69]:

	PassengerId	Survived	Pclass	Age	SibSp	Parch	Fare
0	1	0	3	22	1	0	7.2500
1	2	1	1	38	1	0	71.2833
2	3	1	3	26	0	0	7.9250
3	4	1	1	35	1	0	53.1000
4	5	0	3	35	0	0	8.0500

In [70]:
```python
df = pd.concat([df,sex,embark],axis = 1)
```

In [71]:
```python
df.head()
```

Out[71]:

	PassengerId	Survived	Pclass	Age	SibSp	Parch	Fare	male	Q	S
0	1	0	3	22	1	0	7.2500	1	0	1
1	2	1	1	38	1	0	71.2833	0	0	0
2	3	1	3	26	0	0	7.9250	0	0	1
3	4	1	1	35	1	0	53.1000	0	0	1
4	5	0	3	35	0	0	8.0500	1	0	1

In [72]:
```python
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
```

In [73]:
```python
x = df.drop(columns= ['Survived','PassengerId'],axis=1)
x.head()
```

Out[73]:

	Pclass	Age	SibSp	Parch	Fare	male	Q	S
0	3	22	1	0	7.2500	1	0	1
1	1	38	1	0	71.2833	0	0	0
2	3	26	0	0	7.9250	0	0	1
3	1	35	1	0	53.1000	0	0	1
4	3	35	0	0	8.0500	1	0	1

In [74]:
```python
y = df['Survived']
y.head()
```

Out[74]:
```
0    0
1    1
2    1
3    1
4    0
Name: Survived, dtype: category
Categories (2, int64): [0, 1]
```

In [75]:
```python
x_train,x_test,y_train,y_test = train_test_split(x,y,test_size=0.30,random_state=42)
```

Model Training and Predicting

In [77]:
```python
lr = LogisticRegression()
```

In [78]:
```python
lr.fit(x_train,y_train)
```

```
C:\Users\abhishek ambawale\anaconda3\lib\site-packages\sklearn\linear_model\_logistic.py:814: ConvergenceWarning: lbfgs failed to converge (status=1):
STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

Increase the number of iterations (max_iter) or scale the data as shown in:
    https://scikit-learn.org/stable/modules/preprocessing.html
Please also refer to the documentation for alternative solver options:
    https://scikit-learn.org/stable/modules/linear_model.html#logistic-regression
  n_iter_i = _check_optimize_result(
```

Out[78]:
```
LogisticRegression()
```

In [79]:
```python
y_pred = lr.predict(x_test)
```

In [80]:
```python
from sklearn.metrics import accuracy_score
```

In [81]:
```python
score = accuracy_score(y_pred,y_test)
```

In [82]:
```python
score
```

Out[82]:
```
0.8097014925373134
```

Model Evaluation

In [83]:
```python
from sklearn.metrics import classification_report
```

In [84]:
```python
print(classification_report(y_test,y_pred))
```

```
              precision    recall  f1-score   support

           0       0.82      0.87      0.84       157
           1       0.79      0.73      0.76       111

    accuracy                           0.81       268
   macro avg       0.81      0.80      0.80       268
weighted avg       0.81      0.81      0.81       268
```