In [4]:

```python
#importing required libraries
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt

import warnings
warnings.filterwarnings('ignore')

```

In [7]:

```python
# Loading the Dataset
titanic = pd.read_csv('Titanic-Dataset.csv')
titanic
```

Out[7]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	F
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0
...	...	...	...	...	...	...	...	...	...	
886	887	0	2	Montvila, Rev. Juozas	male	27.0	0	0	211536	13.0
887	888	1	1	Graham, Miss. Margaret Edith	female	19.0	0	0	112053	30.0
888	889	0	3	Johnston, Miss. Catherine Helen "Carrie"	female	NaN	1	2	W./C. 6607	23.4
889	890	1	1	Behr, Mr. Karl Howell	male	26.0	0	0	111369	30.0
890	891	0	3	Dooley, Mr. Patrick	male	32.0	0	0	370376	7.7

891 rows × 12 columns

In [8]:

```python
# Reading first 5 rows
titanic.head()
```

Out[8]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Far
				Braund,						

In [8]:

```
# Reading first 5 rows
titanic.head()
```

Out[8]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Far
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.250
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.283
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.925
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.100
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.050

In [9]:

```
# Reading last 5 rows
titanic.tail()
```

Out[9]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare
886	887	0	2	Montvila, Rev. Juozas	male	27.0	0	0	211536	13.00
887	888	1	1	Graham, Miss. Margaret Edith	female	19.0	0	0	112053	30.00
888	889	0	3	Johnston, Miss. Catherine Helen "Carrie"	female	NaN	1	2	W./C. 6607	23.45
889	890	1	1	Behr, Mr. Karl Howell	male	26.0	0	0	111369	30.00
890	891	0	3	Dooley, Mr. Patrick	male	32.0	0	0	370376	7.75

In [10]:

```
# Showing no. of rows and columns of dataset
titanic.shape

```

Out[10]:

```
(891, 12)
```

In [11]:

```
# checking for columns
titanic.columns
```

Out[11]:

```
Index(['PassengerId', 'Survived', 'Pclass', 'Name', 'Sex', 'Age', 'SibS
p',
       'Parch', 'Ticket', 'Fare', 'Cabin', 'Embarked'],
```

In [11]:

```python
# checking for columns
titanic.columns
```

Out[11]:

```
Index(['PassengerId', 'Survived', 'Pclass', 'Name', 'Sex', 'Age', 'SibS
p',
       'Parch', 'Ticket', 'Fare', 'Cabin', 'Embarked'],
      dtype='object')
```

In [12]:

```python
# Checking for data types
titanic.dtypes
```

Out[12]:

```
PassengerId      int64
Survived         int64
Pclass           int64
Name            object
Sex             object
Age            float64
SibSp            int64
Parch            int64
Ticket          object
Fare           float64
Cabin           object
Embarked        object
dtype: object
```

In [13]:

```python
# checking for duplicated values
titanic.duplicated().sum()
```

Out[13]:

```
0
```

In [14]:

```python
# checking for null values
nv = titanic.isna().sum().sort_values(ascending=False)
nv = nv[nv>0]
nv
```

Out[14]:

```
Cabin       687
Age         177
Embarked      2
dtype: int64
```

In [15]:

```python
# Cheecking what percentage column contain missing values
titanic.isnull().sum().sort_values(ascending=False)*100/len(titanic)

```

Out[15]:

```
Cabin          77.104377
Age            19.865320
Embarked        0.224467
PassengerId     0.000000
Survived        0.000000
Pclass          0.000000
Name            0.000000
Sex             0.000000
SibSp           0.000000
Parch           0.000000
Ticket          0.000000
Fare            0.000000
dtype: float64
```

In [16]:

```python
# Since Cabin Column has more than 75 % null values .So , we will drop
titanic.drop(columns = 'Cabin', axis = 1, inplace = True)
titanic.columns
```

Out[16]:

```
Index(['PassengerId', 'Survived', 'Pclass', 'Name', 'Sex', 'Age', 'SibS
p',
```

In [16]:

```python
# Since Cabin Column has more than 75 % null values .So , we will drop
titanic.drop(columns = 'Cabin', axis = 1, inplace = True)
titanic.columns
```

Out[16]:

```
Index(['PassengerId', 'Survived', 'Pclass', 'Name', 'Sex', 'Age', 'SibS
p',
       'Parch', 'Ticket', 'Fare', 'Embarked'],
      dtype='object')
```

In [17]:

```python
# Filling Null Values in Age column with mean values of age column
titanic['Age'].fillna(titanic['Age'].mean(),inplace=True)

# filling null values in Embarked Column with mode values of embarked
titanic['Embarked'].fillna(titanic['Embarked'].mode()[0],inplace=True)
```

In [18]:

```python
# checking for null values
titanic.isna().sum()
```

Out[18]:

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

In [19]:

```python
# Finding no. of unique values in each column of dataset
titanic[['PassengerId', 'Survived', 'Pclass', 'Name', 'Sex', 'Age', 'S
       'Parch', 'Ticket', 'Fare', 'Embarked']].nunique().sort_values()
```

Out[19]:

```
Survived         2
Sex              2
Pclass           3
Embarked         3
SibSp            7
Parch            7
Age             89
Fare           248
Ticket         681
PassengerId    891
Name           891
dtype: int64
```

In [20]:

```python
titanic['Survived'].unique()
```

Out[20]:

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

In [21]:

```python
titanic['Sex'].unique()
```

Out[21]:

```
array(['male', 'female'], dtype=object)
```

In [22]:

```python
titanic['Pclass'].unique()
```

Out[22]:

```
array([3, 1, 2], dtype=int64)
```

In [23]:

```python
titanic['SibSp'].unique()
```

Out[23]:

```
array([1, 0, 3, 4, 2, 5, 8], dtype=int64)
```

In [24]:

```python
titanic['Parch'].unique()
```

Out[22]: array([3, 1, 2], dtype=int64)

In [23]:
```
titanic['SibSp'].unique()
```

Out[23]: array([1, 0, 3, 4, 2, 5, 8], dtype=int64)

In [24]:
```
titanic['Parch'].unique()
```

Out[24]: array([0, 1, 2, 5, 3, 4, 6], dtype=int64)

In [25]:
```
titanic['Embarked'].unique()
```

Out[25]: array(['S', 'C', 'Q'], dtype=object)

In [26]:
```
titanic.drop(columns=['PassengerId','Name','Ticket'],axis=1,inplace=Tr
titanic.columns
```

Out[26]:
```
Index(['Survived', 'Pclass', 'Sex', 'Age', 'SibSp', 'Parch', 'Fare',
       'Embarked'],
      dtype='object')
```

In [27]:
```
# Showing inforamation about the dataset
titanic.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
Data columns (total 8 columns):
 #   Column    Non-Null Count  Dtype  
---  ------    --------------  -----  
 0   Survived  891 non-null    int64  
 1   Pclass    891 non-null    int64  
 2   Sex       891 non-null    object 
 3   Age       891 non-null    float64
 4   SibSp     891 non-null    int64  
 5   Parch     891 non-null    int64  
 6   Fare      891 non-null    float64
 7   Embarked  891 non-null    object 
dtypes: float64(2), int64(4), object(2)
memory usage: 55.8+ KB
```

In [28]:
```
# showing info. about numerical columns
titanic.describe()
```

Out[28]:

	Survived	Pclass	Age	SibSp	Parch	Fare
count	891.000000	891.000000	891.000000	891.000000	891.000000	891.000000
mean	0.383838	2.308642	29.699118	0.523008	0.381594	32.204208
std	0.486592	0.836071	13.002015	1.102743	0.806057	49.693429
min	0.000000	1.000000	0.420000	0.000000	0.000000	0.000000
25%	0.000000	2.000000	22.000000	0.000000	0.000000	7.910400
50%	0.000000	3.000000	29.699118	0.000000	0.000000	14.454200
75%	1.000000	3.000000	35.000000	1.000000	0.000000	31.000000
max	1.000000	3.000000	80.000000	8.000000	6.000000	512.329200

In [29]:
```
# showing info. about categorical columns
titanic.describe(include='O')
```

Out[29]:

	Sex	Embarked
count	891	891

In [29]:
```
# showing info. about categorical columns
titanic.describe(include='O')
```

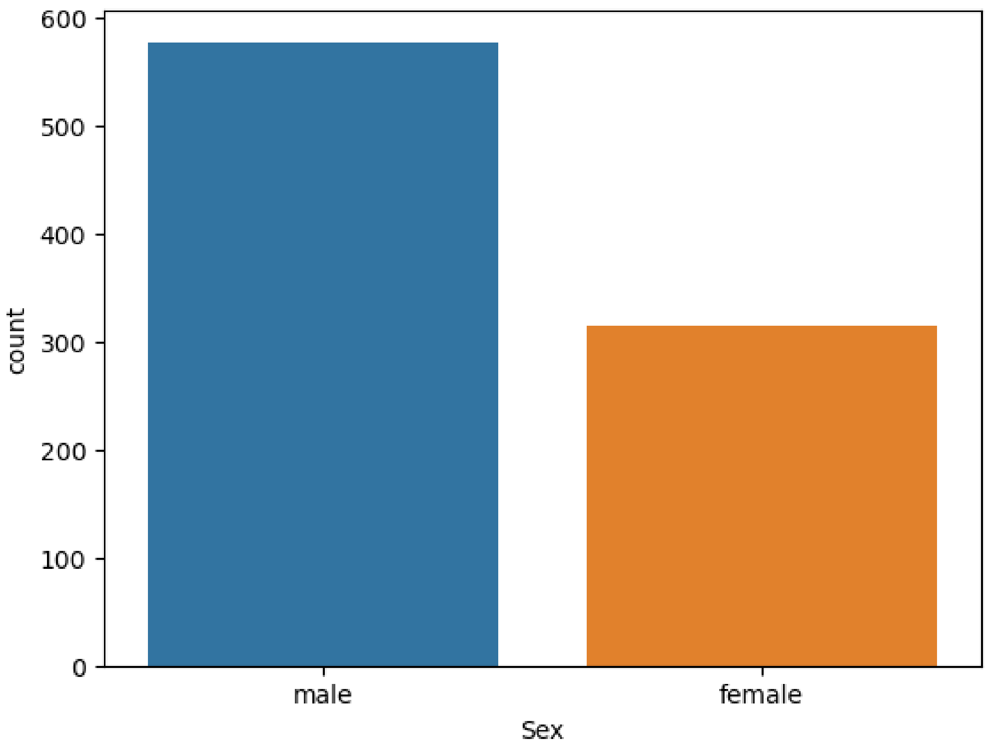
Out[29]:

	Sex	Embarked
count	891	891
unique	2	3
top	male	S
freq	577	646

In [30]:
```
d1 = titanic['Sex'].value_counts()
d1
```

Out[30]:
```
male      577
female    314
Name: Sex, dtype: int64
```

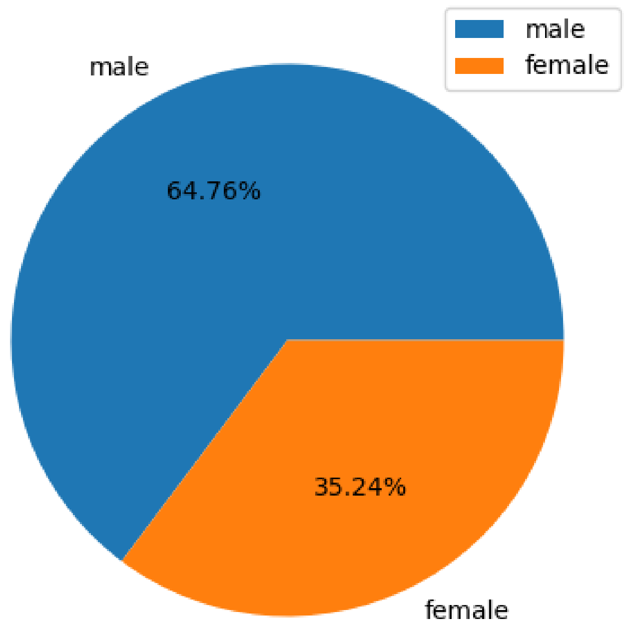
In [31]:
```
# Plotting Count plot for sex column
sns.countplot(x=titanic['Sex'])
plt.show()
```



In [32]:
```
# Plotting Percantage Distribution of Sex Column
plt.figure(figsize=(5,5))
plt.pie(d1.values,labels=d1.index,autopct='%.2f%%')
plt.legend()
plt.show()
```

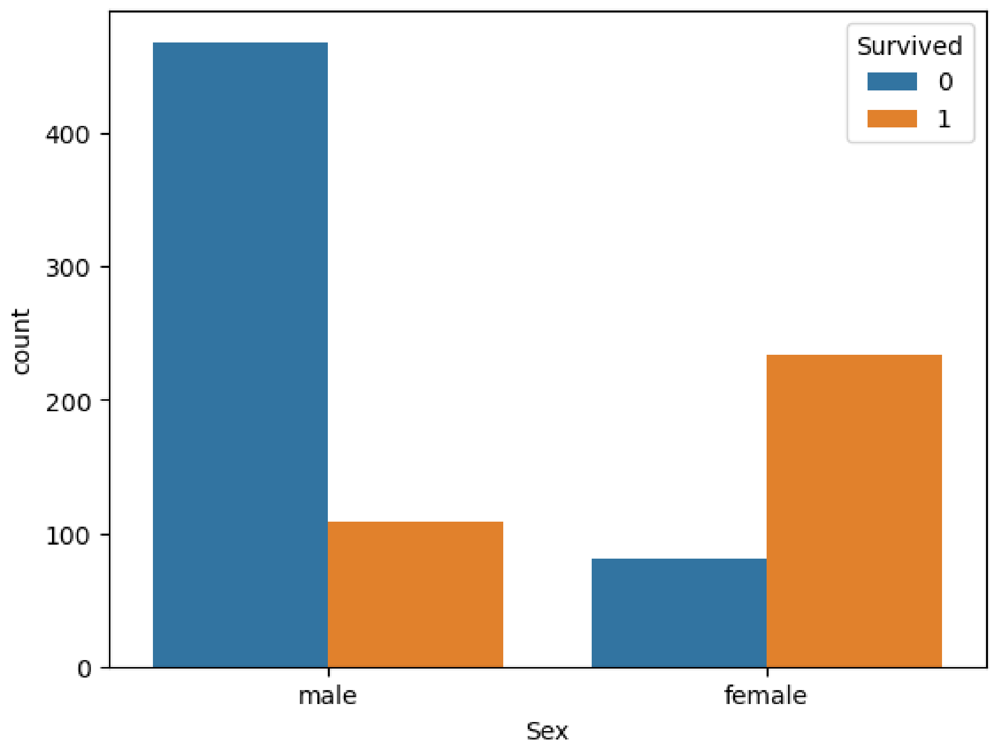
In [32]:

```python
# Plotting Percantage Distribution of Sex Column
plt.figure(figsize=(5,5))
plt.pie(d1.values,labels=d1.index,autopct='%.2f%%')
plt.legend()
plt.show()
```



In [33]:

```python
# Showing Distribution of Sex Column Survived Wise
sns.countplot(x=titanic['Sex'],hue=titanic['Survived']) # In Sex (0 re
plt.show()
```

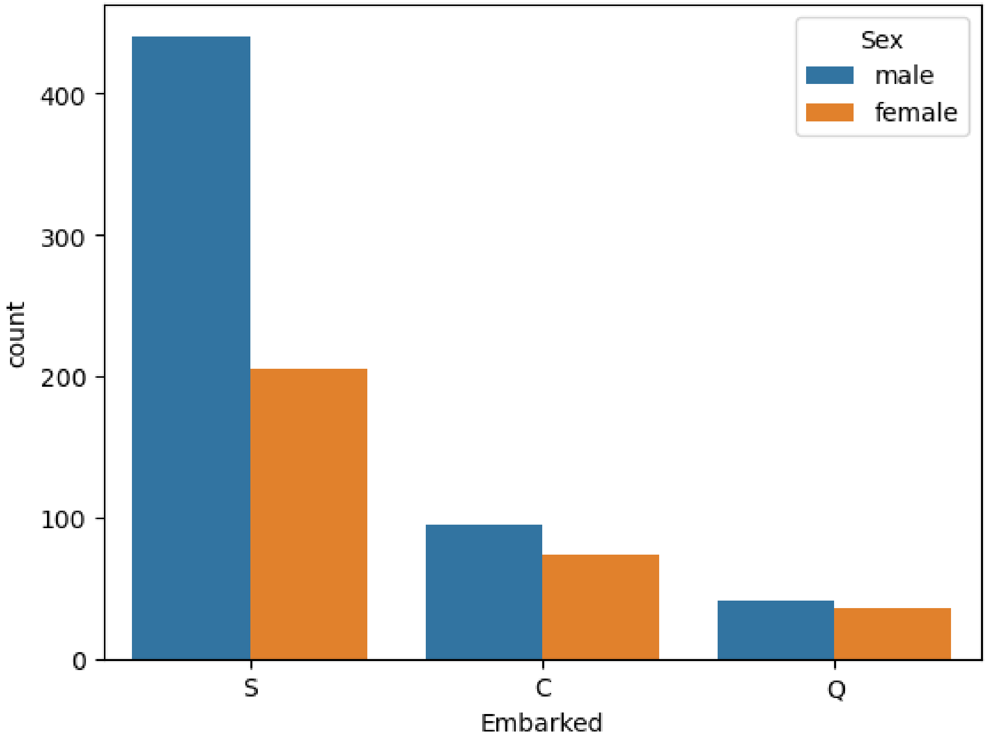


In [34]:

```python
# Showing Distribution of Embarked Sex wise
sns.countplot(x=titanic['Embarked'],hue=titanic['Sex'])
plt.show()
```

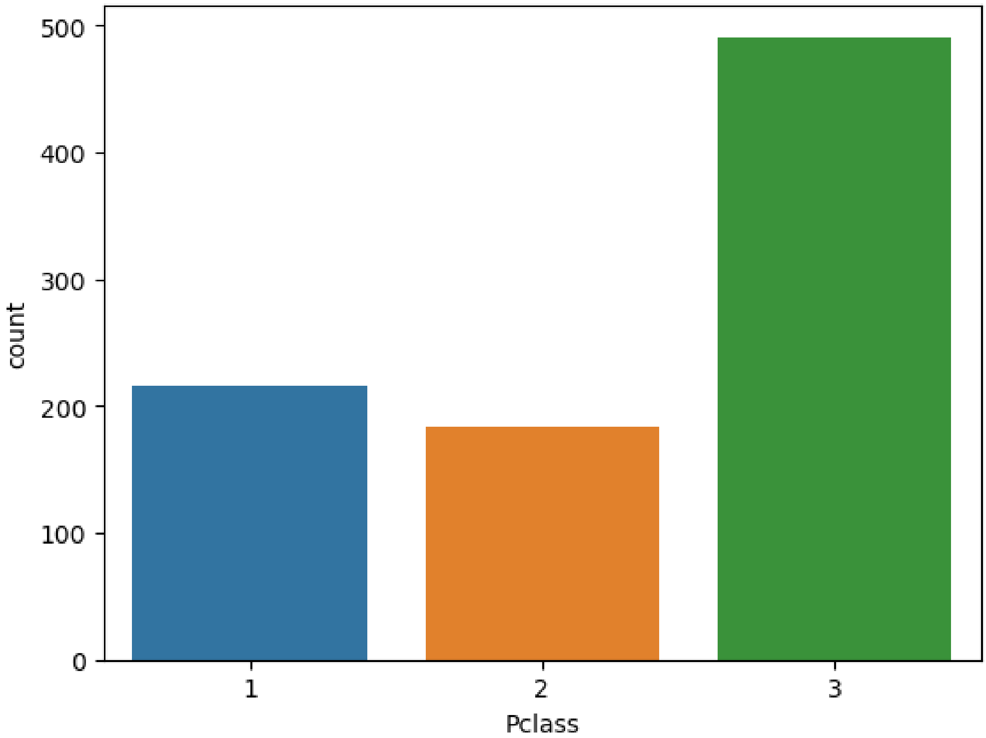
In [34]:

```
# Showing Distribution of Embarked Sex wise
sns.countplot(x=titanic['Embarked'],hue=titanic['Sex'])
plt.show()
```



In [35]:

```
# Plotting CountPlot for Pclass Column
sns.countplot(x=titanic['Pclass'])
plt.show()
```

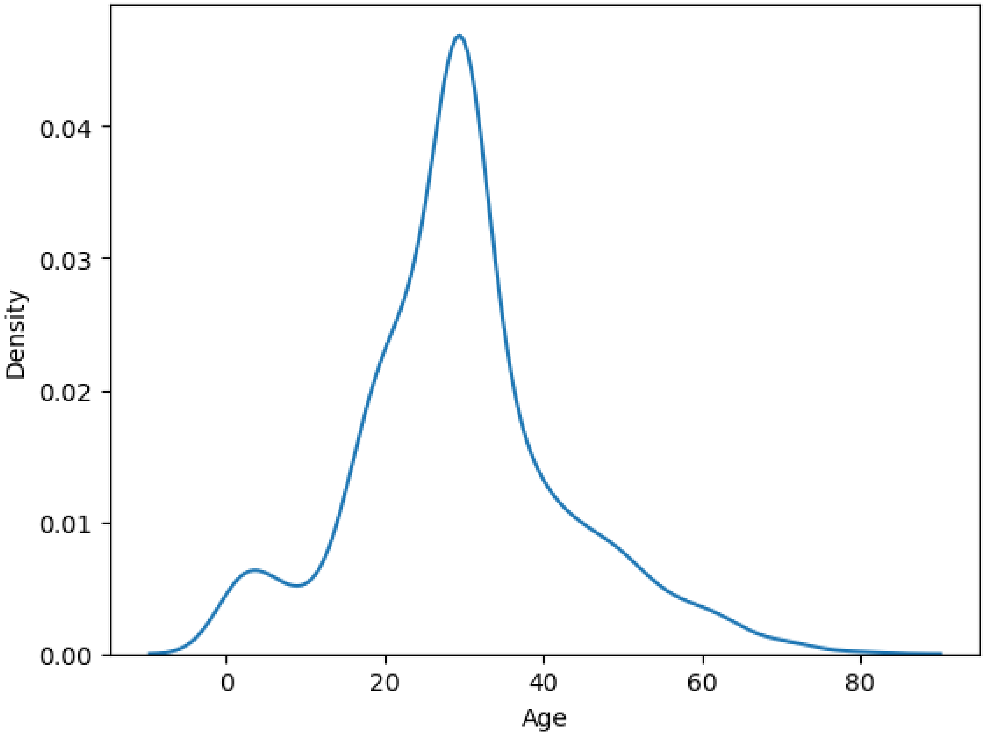


In [36]:

```
# Age Distribution
sns.kdeplot(x=titanic['Age'])
plt.show()
```

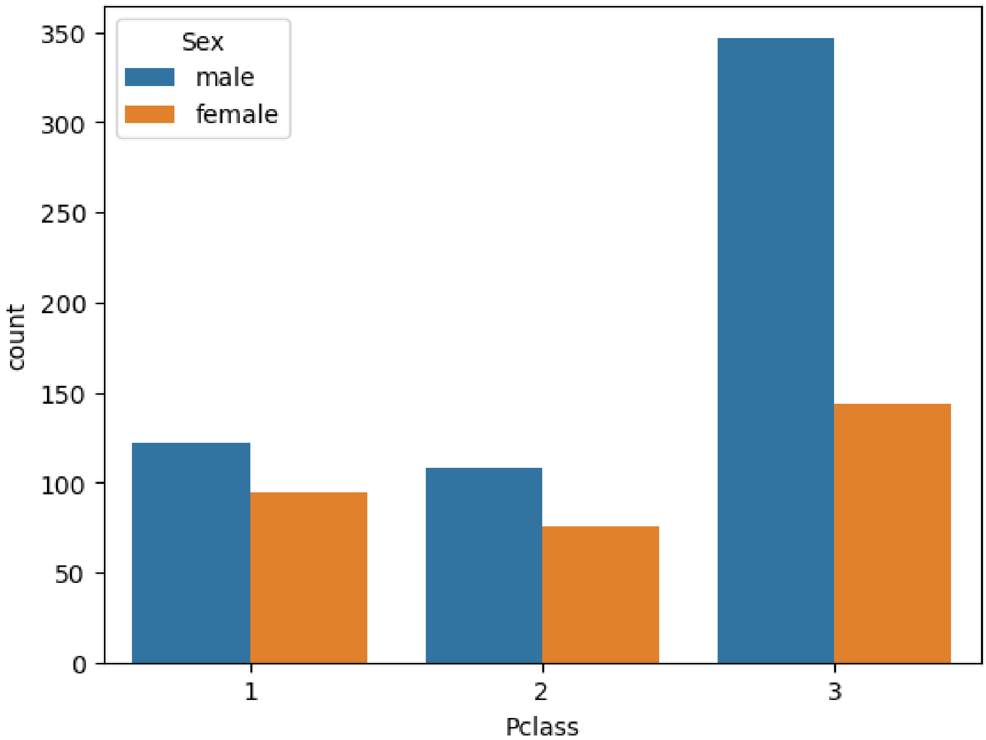
In [36]:

```python
# Age Distribution
sns.kdeplot(x=titanic['Age'])
plt.show()
```



In [37]:

```python
# Showing Distribution of Pclass Sex wise
sns.countplot(x=titanic['Pclass'],hue=titanic['Sex'])
plt.show()
```



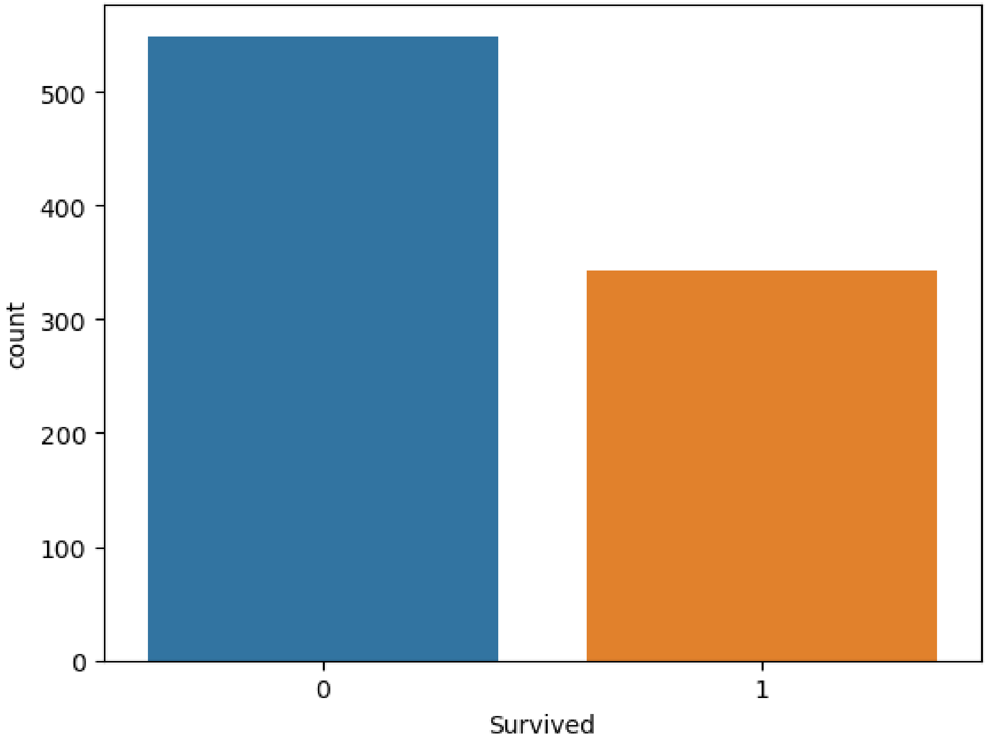
In [38]:

```python
# Plotting CountPlot for Survived Column
print(titanic['Survived'].value_counts())
sns.countplot(x=titanic['Survived'])
plt.show()

```

In [38]:

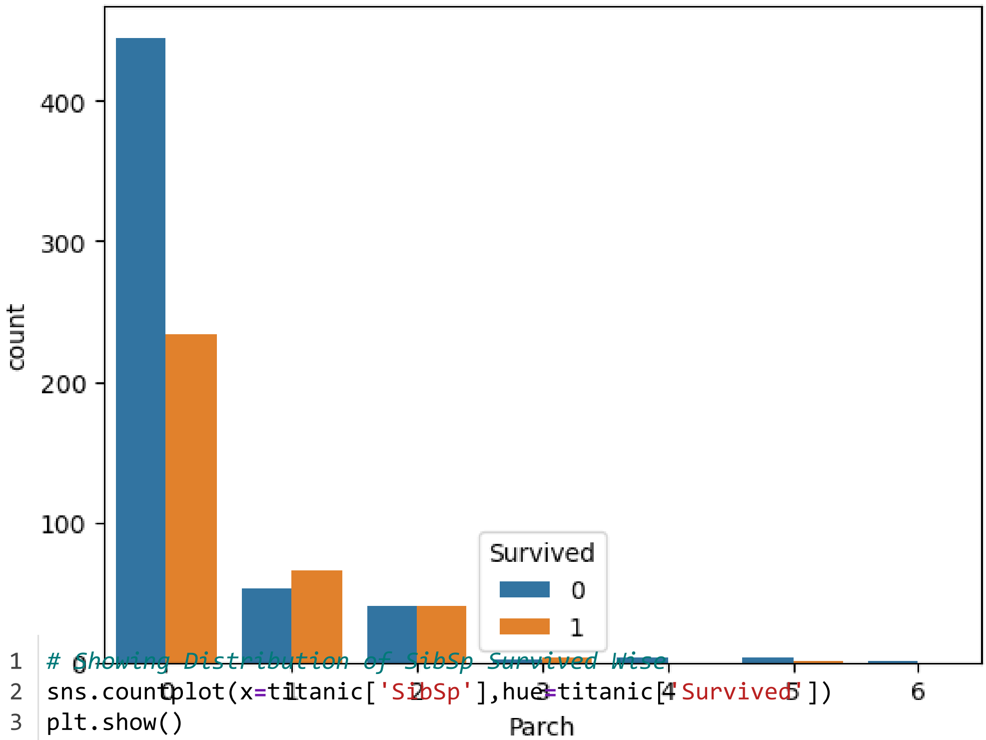
```python
# Plotting CountPlot for Survived Column
print(titanic['Survived'].value_counts())
sns.countplot(x=titanic['Survived'])
plt.show()

```

```
0    549
1    342
Name: Survived, dtype: int64
```



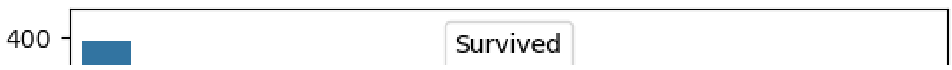
In [39]:

```python
# Showing Distribution of Parch Survived Wise
sns.countplot(x=titanic['Parch'],hue=titanic['Survived'])
plt.show()
```



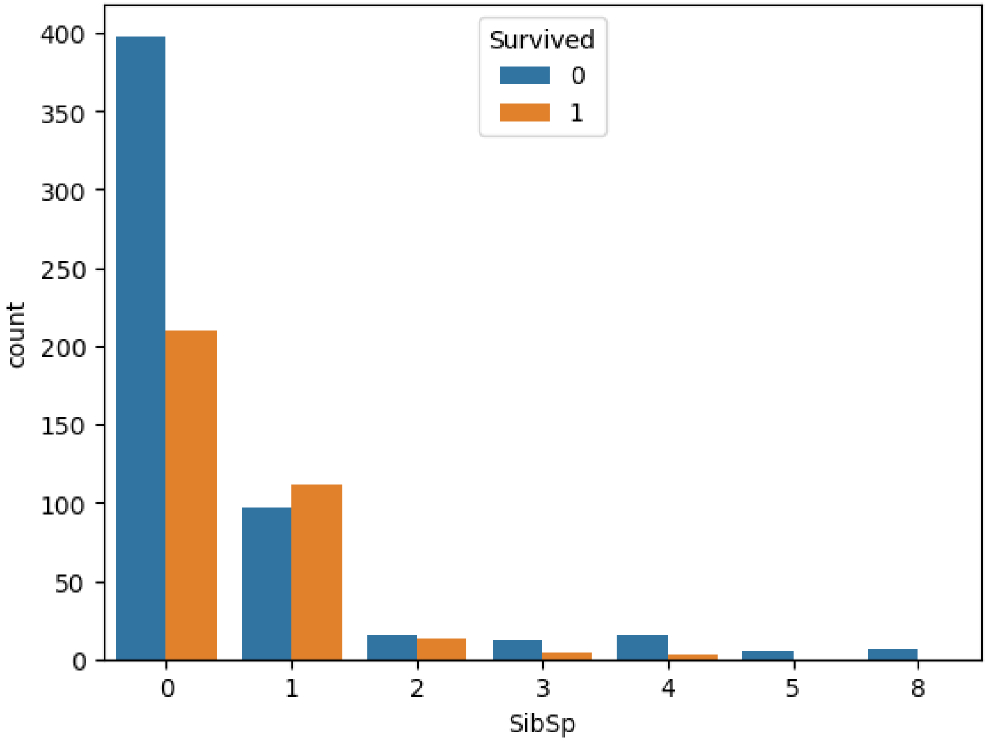
In [40]:

```python
# Showing Distribution of SibSp Survived Wise
sns.countplot(x=titanic['SibSp'],hue=titanic['Survived'])
plt.show()
```



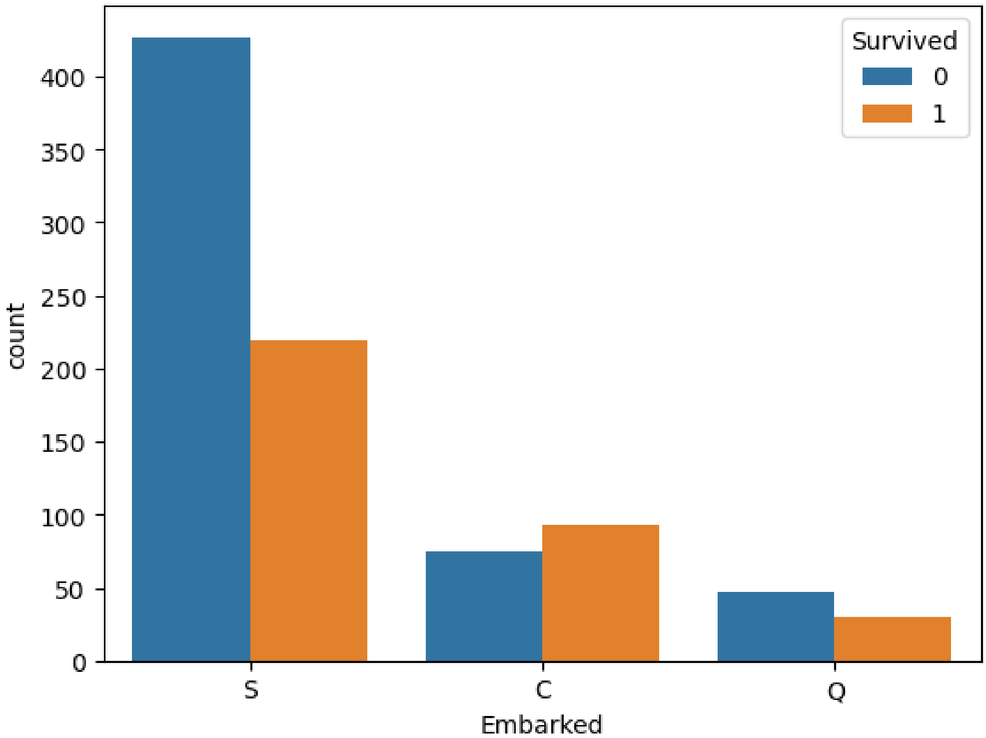
In [40]:

```
# Showing Distribution of SibSp Survived Wise
sns.countplot(x=titanic['SibSp'],hue=titanic['Survived'])
plt.show()
```



In [41]:

```
# Showing Distribution of Embarked Survived wise
sns.countplot(x=titanic['Embarked'],hue=titanic['Survived'])
plt.show()
```

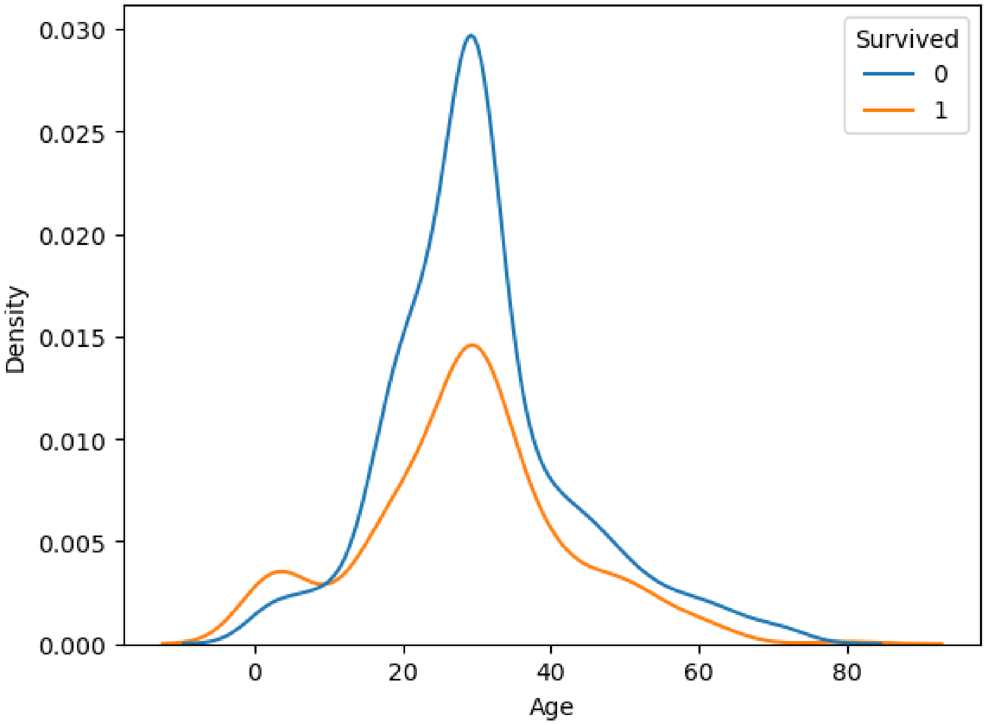


In [42]:

```
# Showinf Distribution of Age Survived Wise
sns.kdeplot(x=titanic['Age'],hue=titanic['Survived'])
plt.show()
```

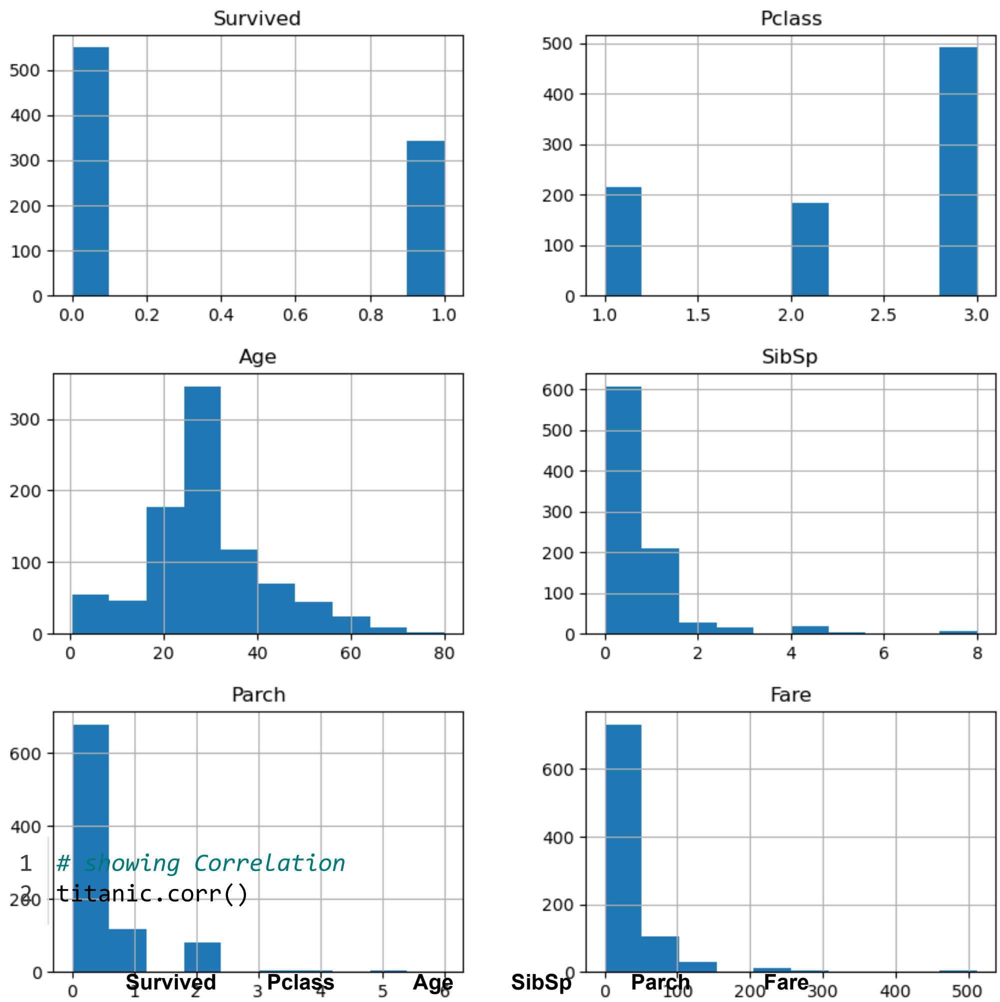
In [42]:

```
# Showinf Distribution of Age Survived Wise
sns.kdeplot(x=titanic['Age'],hue=titanic['Survived'])
plt.show()
```



In [43]:

```
# Plotting Histplot for Dataset
titanic.hist(figsize=(10,10))
plt.show()
```

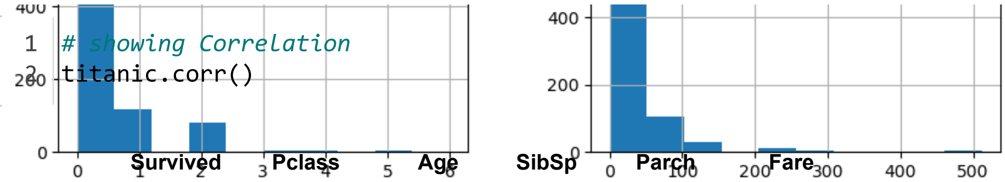


In [45]:

```
# showing Correlation
titanic.corr()
```

Out[45]:

	Survived	Pclass	Age	SibSp	Parch	Fare
Survived	1.000000	-0.338481	-0.069809	-0.035322	0.081629	0.257307



In [45]:

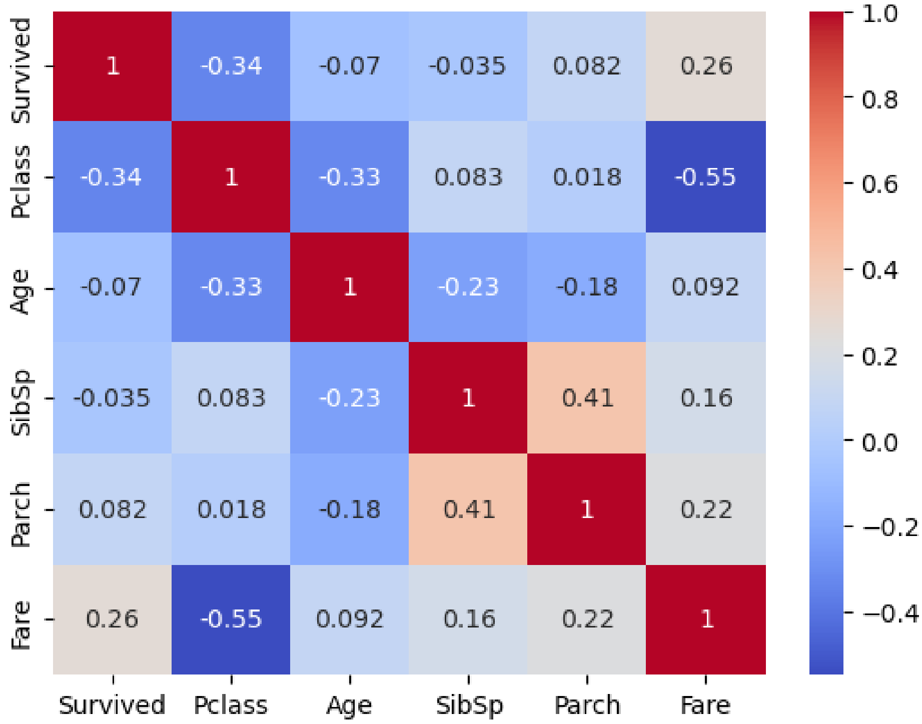
```
# showing Correlation
titanic.corr()
```

Out[45]:

	Survived	Pclass	Age	SibSp	Parch	Fare
Survived	1.000000	-0.338481	-0.069809	-0.035322	0.081629	0.257307
Pclass	-0.338481	1.000000	-0.331339	0.083081	0.018443	-0.549500
Age	-0.069809	-0.331339	1.000000	-0.232625	-0.179191	0.091566
SibSp	-0.035322	0.083081	-0.232625	1.000000	0.414838	0.159651
Parch	0.081629	0.018443	-0.179191	0.414838	1.000000	0.216225
Fare	0.257307	-0.549500	0.091566	0.159651	0.216225	1.000000

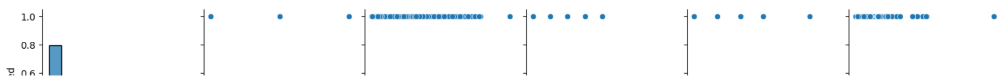
In [46]:

```
# Showing Correlation Plot
sns.heatmap(titanic.corr(),annot=True,cmap='coolwarm')
plt.show()
```



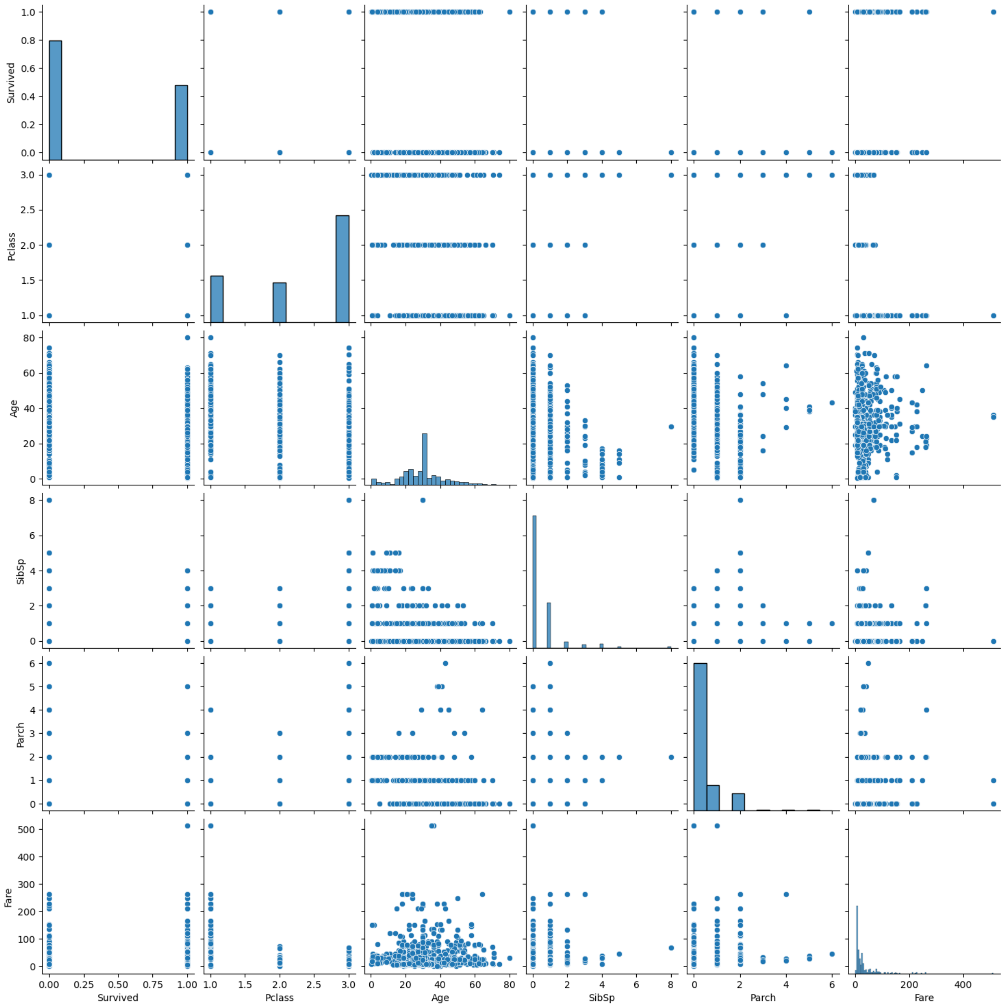
In [47]:

```
# Plotting pairplot
sns.pairplot(titanic)
plt.show()
```



In [47]:

```
# Plotting pairplot
sns.pairplot(titanic)
plt.show()
```



In [48]:

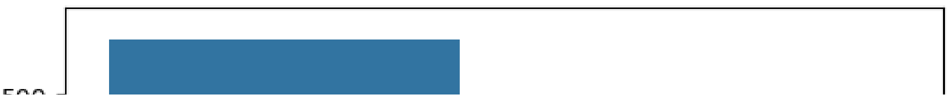
```
titanic['Survived'].value_counts()
```

Out[48]:

```
0    549
1    342
Name: Survived, dtype: int64
```

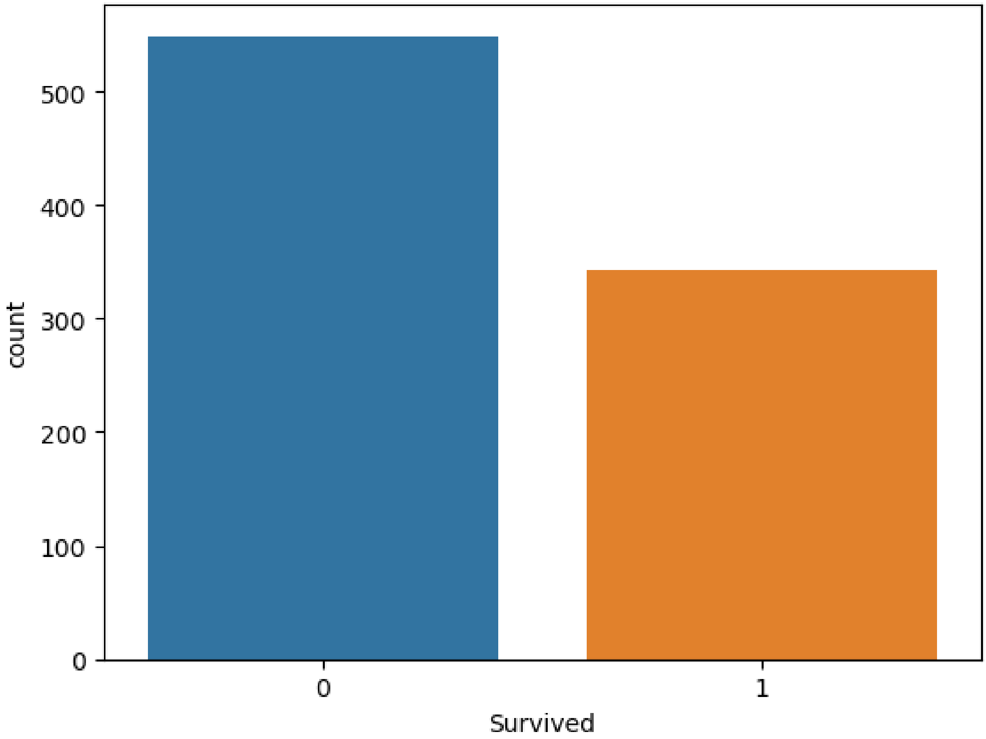
In [49]:

```
sns.countplot(x=titanic['Survived'])
plt.show()
```



In [49]:

```
sns.countplot(x=titanic['Survived'])
plt.show()
```



In [50]:

```
from sklearn.preprocessing import LabelEncoder
# Create an instance of LabelEncoder
le = LabelEncoder()

# Apply label encoding to each categorical column
for column in ['Sex','Embarked']:
    titanic[column] = le.fit_transform(titanic[column])

titanic.head()

# Sex Column

# 0 represents female
# 1 represents Male

# Embarked Column

# 0 represents C
# 1 represents Q
# 2 represents S
```

Out[50]:

	Survived	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked
0	0	3	1	22.0	1	0	7.2500	2
1	1	1	0	38.0	1	0	71.2833	0
2	1	3	0	26.0	0	0	7.9250	2
3	1	1	0	35.0	1	0	53.1000	2
4	0	3	1	35.0	0	0	8.0500	2

In [51]:

```
# importing libraries

from sklearn.model_selection import train_test_split
from sklearn.ensemble import RandomForestClassifier
from sklearn.tree import DecisionTreeClassifier
from sklearn.neighbors import KNeighborsClassifier
```

In [51]:

```
# importing libraries

from sklearn.model_selection import train_test_split
from sklearn.ensemble import RandomForestClassifier
from sklearn.tree import DecisionTreeClassifier
from sklearn.neighbors import KNeighborsClassifier
from sklearn.svm import SVC
from sklearn.linear_model import LogisticRegression
from sklearn.ensemble import AdaBoostClassifier
from sklearn.metrics import confusion_matrix,classification_report,acc
```

In [52]:

```
cols = ['Pclass','Sex','Age','SibSp','Parch','Fare','Embarked']
x = titanic[cols]
y = titanic['Survived']
print(x.shape)
print(y.shape)
print(type(x))  # DataFrame
print(type(y))  # Series
```

```
(891, 7)
(891,)
<class 'pandas.core.frame.DataFrame'>
<class 'pandas.core.series.Series'>
```

In [53]:

```
x.head()
```

Out[53]:

	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked
0	3	1	22.0	1	0	7.2500	2
1	1	0	38.0	1	0	71.2833	0
2	3	0	26.0	0	0	7.9250	2
3	1	0	35.0	1	0	53.1000	2
4	3	1	35.0	0	0	8.0500	2

In [54]:

```
y.head()
```

Out[54]:

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

In [55]:

```
print(891*0.10)
```

```
89.10000000000001
```

In [56]:

```
x_train,x_test,y_train,y_test = train_test_split(x,y,test_size=0.10,ra
print(x_train.shape)
print(x_test.shape)
print(y_train.shape)
print(y_test.shape)
```

```
(801, 7)
(90, 7)
(801,)
(90,)
```

In [57]:

```
def cls_eval(ytest,ypred):
    cm = confusion_matrix(ytest,ypred)
    print('Confusion Matrix\n',cm)
    print('Classification Report\n',classification_report(ytest,ypred)

def mscore(model):
```

(801,)
(90,)

In [57]:
```
def cls_eval(ytest,ypred):
    cm = confusion_matrix(ytest,ypred)
    print('Confusion Matrix\n',cm)
    print('Classification Report\n',classification_report(ytest,ypred)

def mscore(model):
    print('Training Score',model.score(x_train,y_train))  # Training A
    print('Testing Score',model.score(x_test,y_test))     # Testing Ac
```

In [58]:
```
# Building the Logistic Regression Model
lr = LogisticRegression(max_iter=1000,solver='liblinear')
lr.fit(x_train,y_train)
```

Out[58]:
```
LogisticRegression(max_iter=1000, solver='liblinear')
```

In [59]:
```
# Computing Training and Testing score
mscore(lr)
```

```
Training Score 0.8052434456928839
Testing Score 0.7666666666666667
```

In [60]:
```
# Generating Prediction
ypred_lr = lr.predict(x_test)
print(ypred_lr)
```

```
[1 0 1 1 1 0 0 1 0 1 0 1 0 0 1 0 0 0 0 1 0 0 1 0 1 0 1 1 0 1 1 0 0 1 0 0
0
 0 0 0 1 1 1 0 0 0 0 0 0 1 0 0 1 0 0 0 1 0 0 0 1 0 0 0 0 0 1 0 0 1 0 0 0 0
0
 1 0 1 0 0 1 0 0 0 0 1 0 0 0 0 1]
```

In [61]:
```
# Evaluate the model - confusion matrix, classification Report, Accura
cls_eval(y_test,ypred_lr)
acc_lr = accuracy_score(y_test,ypred_lr)
print('Accuracy Score',acc_lr)
```

```
Confusion Matrix
 [[46  7]
 [14 23]]
Classification Report
               precision    recall  f1-score   support

           0       0.77      0.87      0.81        53
           1       0.77      0.62      0.69        37

    accuracy                           0.77        90
   macro avg       0.77      0.74      0.75        90
weighted avg       0.77      0.77      0.76        90

Accuracy Score 0.7666666666666667
```

In [62]:
```
# Building the knnClassifier Model
knn=KNeighborsClassifier(n_neighbors=8)
knn.fit(x_train,y_train)
```

Out[62]:
```
KNeighborsClassifier(n_neighbors=8)
```

In [63]:
```
# Computing Training and Testing score
mscore(knn)
```

```
Training Score 0.7752808988764045
Testing Score 0.6777777777777778
```

In [64]:
```
# Generating Prediction
ypred_knn = knn.predict(x_test)
print(ypred_knn)

```

```
[1 0 0 1 1 0 0 1 1 0 0 0 1 1 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1 0 0 0 0
```

```
mscore(knn)
```

Training Score 0.7752808988764045
Testing Score 0.6777777777777778

In [64]:
```
# Generating Prediction
ypred_knn = knn.predict(x_test)
print(ypred_knn)
```

```
[1 0 0 1 1 0 0 1 1 0 0 0 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1 0 0 0 0
 1
 0 1 0 0 0 1 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 1 0 0 0 1
 0
 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0]
```

In [65]:
```
# Evaluate the model - confusion matrix, classification Report, Accura
cls_eval(y_test,ypred_knn)
acc_knn = accuracy_score(y_test,ypred_knn)
print('Accuracy Score',acc_knn)
```

```
Confusion Matrix
 [[47  6]
 [23 14]]
Classification Report
               precision    recall  f1-score   support

           0       0.67      0.89      0.76        53
           1       0.70      0.38      0.49        37

    accuracy                           0.68        90
   macro avg       0.69      0.63      0.63        90
weighted avg       0.68      0.68      0.65        90

Accuracy Score 0.6777777777777778
```

In [66]:
```
# Building Support Vector Classifier Model
svc = SVC(C=1.0)
svc.fit(x_train, y_train)
```

Out[66]: SVC()

In [67]:
```
# Computing Training and Testing score
mscore(svc)
```

```
Training Score 0.6891385767790262
Testing Score 0.6333333333333333
```

In [68]:
```
# Generating Prediction
ypred_svc = svc.predict(x_test)
print(ypred_svc)
```

```
[0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 1 0 0 1 0 0 0 0 0 0
 0
 0 1 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 1
 0
 0 0 0 0 0 1 1 1 0 0 0 0 0 0 0 0 0]
```

In [69]:
```
# Evaluate the model - confusion matrix, classification Report, Accura
cls_eval(y_test,ypred_svc)
acc_svc = accuracy_score(y_test,ypred_svc)
print('Accuracy Score',acc_svc)
```

Confusion Matrix

In [69]:

```
# Evaluate the model - confusion matrix, classification Report, Accura
cls_eval(y_test,ypred_svc)
acc_svc = accuracy_score(y_test,ypred_svc)
print('Accuracy Score',acc_svc)
```

```
Confusion Matrix
 [[48  5]
 [28  9]]
Classification Report
               precision    recall  f1-score   support

           0       0.63      0.91      0.74        53
           1       0.64      0.24      0.35        37

    accuracy                           0.63        90
   macro avg       0.64      0.57      0.55        90
weighted avg       0.64      0.63      0.58        90

Accuracy Score 0.6333333333333333
```

In [75]:

```
# Building the RandomForest Classifier Model
rfc=RandomForestClassifier(n_estimators=80,criterion='entropy',min_sam
rfc.fit(x_train,y_train)
```

Out[75]:

```
RandomForestClassifier(criterion='entropy', max_depth=10, min_samples_spl
it=5,
                       n_estimators=80)
```

In [76]:

```
# Computing Training and Testing score
mscore(rfc)
```

```
Training Score 0.920099875156055
Testing Score 0.7555555555555555
```

In [77]:

```
# Generating Prediction
ypred_rfc = rfc.predict(x_test)
print(ypred_rfc)
```

```
[1 0 1 1 1 0 0 1 1 1 0 0 0 0 1 0 0 0 0 1 0 0 1 0 1 0 1 1 0 1 1 0 0 0 0 0
1
 0 1 0 0 1 1 0 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0
0
 1 0 1 0 0 1 0 0 0 0 1 0 0 0 0 0 1]
```

In [81]:

```
# Evaluate the model - confusion matrix, classification Report, Accura
cls_eval(y_test,ypred_rfc)
acc_rfc = accuracy_score(y_test,ypred_rfc)
print('Accuracy Score',acc_rfc)
```

```
Confusion Matrix
 [[47  6]
 [16 21]]
Classification Report
               precision    recall  f1-score   support

           0       0.75      0.89      0.81        53
           1       0.78      0.57      0.66        37

    accuracy                           0.76        90
   macro avg       0.76      0.73      0.73        90
weighted avg       0.76      0.76      0.75        90

Accuracy Score 0.7555555555555555
```

In [79]:

```
# Building the DecisionTree Classifier Model
dt = DecisionTreeClassifier(max_depth=5,criterion='entropy',min_sample
dt.fit(x_train,y_train)
```

Out[79]:

```
DecisionTreeClassifier(criterion='entropy', max_depth=5, min_samples_spli
t=10)
```

```
    macro avg       0.76      0.73      0.73        90
 weighted avg       0.76      0.76      0.75        90

Accuracy Score 0.7555555555555555
```

In [79]:
```python
# Building the DecisionTree Classifier Model
dt = DecisionTreeClassifier(max_depth=5,criterion='entropy',min_sample
dt.fit(x_train,y_train)
```

Out[79]:
```
DecisionTreeClassifier(criterion='entropy', max_depth=5, min_samples_spli
t=10)
```

In [80]:
```python
# Computing Training and Testing score
mscore(dt)
```

```
Training Score 0.8526841448189763
Testing Score 0.7777777777777778
```

In [82]:
```python
# Generating Prediction
ypred_dt = dt.predict(x_test)
print(ypred_dt)
```

```
[1 0 1 1 1 0 0 1 0 1 0 1 0 0 1 0 0 0 0 1 0 0 1 0 1 0 1 1 0 1 1 0 0 1 0 0
1
 0 0 0 1 1 1 0 1 0 0 0 0 0 0 1 0 0 0 1 0 0 0 1 0 0 0 0 0 1 0 0 1 0 0 0 0
0
 1 0 1 0 0 1 0 0 0 0 0 1 0 0 0 0 0 1]
```

In [83]:
```python
# Evaluate the model - confusion matrix, classification Report, Accura
cls_eval(y_test,ypred_dt)
acc_dt = accuracy_score(y_test,ypred_dt)
print('Accuracy Score',acc_dt)
```

```
Confusion Matrix
 [[46  7]
 [13 24]]
Classification Report
               precision    recall  f1-score   support

           0       0.78      0.87      0.82        53
           1       0.77      0.65      0.71        37

    accuracy                           0.78        90
   macro avg       0.78      0.76      0.76        90
weighted avg       0.78      0.78      0.77        90

Accuracy Score 0.7777777777777778
```

In [84]:
```python
# Builing the Adaboost model
ada_boost  = AdaBoostClassifier(n_estimators=80)
ada_boost.fit(x_train,y_train)
```

Out[84]:
```
AdaBoostClassifier(n_estimators=80)
```

In [85]:
```python
# Computing the Training and Testing Score
mscore(ada_boost)
```

```
Training Score 0.8564294631710362
Testing Score 0.7666666666666667
```

In [86]:
```python
# Generating the predictions
ypred_ada_boost = ada_boost.predict(x_test)
```

In [87]:
```python
# Evaluate the model - confusion matrix, classification Report, Accura
cls_eval(y_test,ypred_ada_boost)
acc_adab = accuracy_score(y_test,ypred_ada_boost)
print('Accuracy Score',acc_adab)
```

```
Confusion Matrix
```

In [87]:

```
# Evaluate the model - confusion matrix, classification Report, Accurc
cls_eval(y_test,ypred_ada_boost)
acc_adab = accuracy_score(y_test,ypred_ada_boost)
print('Accuracy Score',acc_adab)
```

```
Confusion Matrix
 [[45  8]
 [13 24]]
Classification Report
               precision    recall  f1-score   support

           0       0.78      0.85      0.81        53
           1       0.75      0.65      0.70        37

    accuracy                           0.77        90
   macro avg       0.76      0.75      0.75        90
weighted avg       0.77      0.77      0.76        90

Accuracy Score 0.7666666666666667
```

In [88]:

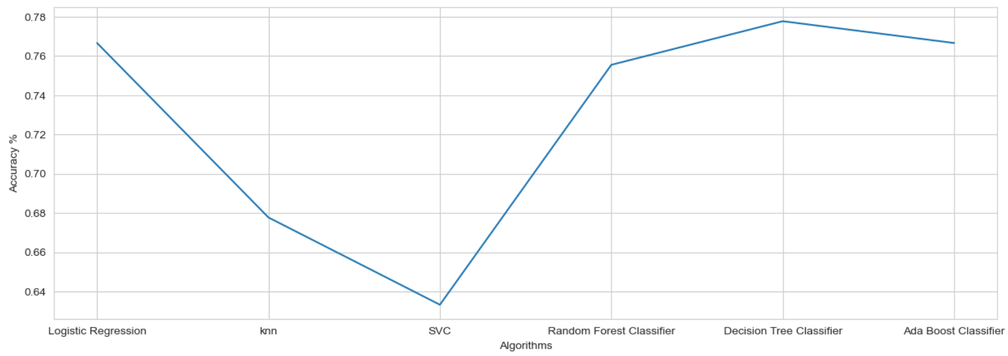
```
models = pd.DataFrame({
    'Model': ['Logistic Regression','knn','SVC','Random Forest Classif
    'Score': [acc_lr,acc_knn,acc_svc,acc_rfc,acc_dt,acc_adab]})

models.sort_values(by = 'Score', ascending = False)
```

Out[88]:

	Model	Score
4	Decision Tree Classifier	0.777778
0	Logistic Regression	0.766667
5	Ada Boost Classifier	0.766667
3	Random Forest Classifier	0.755556
1	knn	0.677778
2	SVC	0.633333

In [91]:

```
colors = ["blue", "green", "red", "yellow","orange","purple"]

sns.set_style("whitegrid")
plt.figure(figsize=(15,5))
plt.ylabel("Accuracy %")
plt.xlabel("Algorithms")
sns.lineplot(x=models['Model'],y=models['Score'], palette=colors )
plt.show()
```



In [95]:

```
colors = ["black", "violet", "pink", "yellow","orange","cyan",]

sns.set_style("whitegrid")
plt.figure(figsize=(15,5))
plt.ylabel("Accuracy %")
plt.xlabel("Algorithms")
```

In [95]:

```
colors = ["black", "violet", "pink", "yellow","orange","cyan",]

sns.set_style("whitegrid")
plt.figure(figsize=(15,5))
plt.ylabel("Accuracy %")
plt.xlabel("Algorithms")
sns.barplot(x=models['Model'],y=models['Score'], palette=colors )
plt.show()
```