```python
import pandas as pd
df=pd.read_csv('Titanic-Dataset.csv')
df
```

```
     PassengerId  Survived  Pclass  \
0              1         0       3   
1              2         1       1   
2              3         1       3   
3              4         1       1   
4              5         0       3   
..           ...       ...     ...   
886          887         0       2   
887          888         1       1   
888          889         0       3   
889          890         1       1   
890          891         0       3   

                                                  Name     Sex   Age 
SibSp  \
0                              Braund, Mr. Owen Harris    male  22.0 
1   
1    Cumings, Mrs. John Bradley (Florence Briggs Th...  female  38.0 
1   
2                               Heikkinen, Miss. Laina  female  26.0 
0   
3         Futrelle, Mrs. Jacques Heath (Lily May Peel)  female  35.0 
1   
4                             Allen, Mr. William Henry    male  35.0 
0   
..                                                 ...     ...   ... 
...   
886                              Montvila, Rev. Juozas    male  27.0 
0   
887                       Graham, Miss. Margaret Edith  female  19.0 
0   
888           Johnston, Miss. Catherine Helen "Carrie"  female   NaN 
1   
889                              Behr, Mr. Karl Howell    male  26.0 
0   
890                                Dooley, Mr. Patrick    male  32.0 
0   

     Parch            Ticket     Fare Cabin Embarked  
0        0         A/5 21171   7.2500   NaN        S  
1        0          PC 17599  71.2833   C85        C  
2        0  STON/O2. 3101282   7.9250   NaN        S  
3        0            113803  53.1000  C123        S  
4        0            373450   8.0500   NaN        S  
..     ...               ...      ...   ...      ...  
886      0            211536  13.0000   NaN        S  
```

```
887      0            112053  30.0000   B42        S
888      2        W./C. 6607  23.4500   NaN        S
889      0            111369  30.0000  C148        C
890      0            370376   7.7500   NaN        Q

[891 rows x 12 columns]
```

```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
import warnings
warnings. filterwarnings( 'ignore')
%matplotlib inline
```

```
train =pd. read_csv('Titanic-Dataset.csv')
test= pd. read_csv('Titanic-Dataset.csv')
train. head ()
```

```
   PassengerId  Survived  Pclass  \
0            1         0       3
1            2         1       1
2            3         1       3
3            4         1       1
4            5         0       3

                                                Name     Sex   Age
SibSp  \
0                            Braund, Mr. Owen Harris    male  22.0
1
1  Cumings, Mrs. John Bradley (Florence Briggs Th...  female  38.0
1
2                             Heikkinen, Miss. Laina  female  26.0
0
3       Futrelle, Mrs. Jacques Heath (Lily May Peel)  female  35.0
1
4                           Allen, Mr. William Henry    male  35.0
0

   Parch            Ticket     Fare Cabin Embarked
0      0         A/5 21171   7.2500   NaN        S
1      0          PC 17599  71.2833   C85        C
2      0  STON/O2. 3101282   7.9250   NaN        S
3      0            113803  53.1000  C123        S
4      0            373450   8.0500   NaN        S
```

```
train. describe()
```

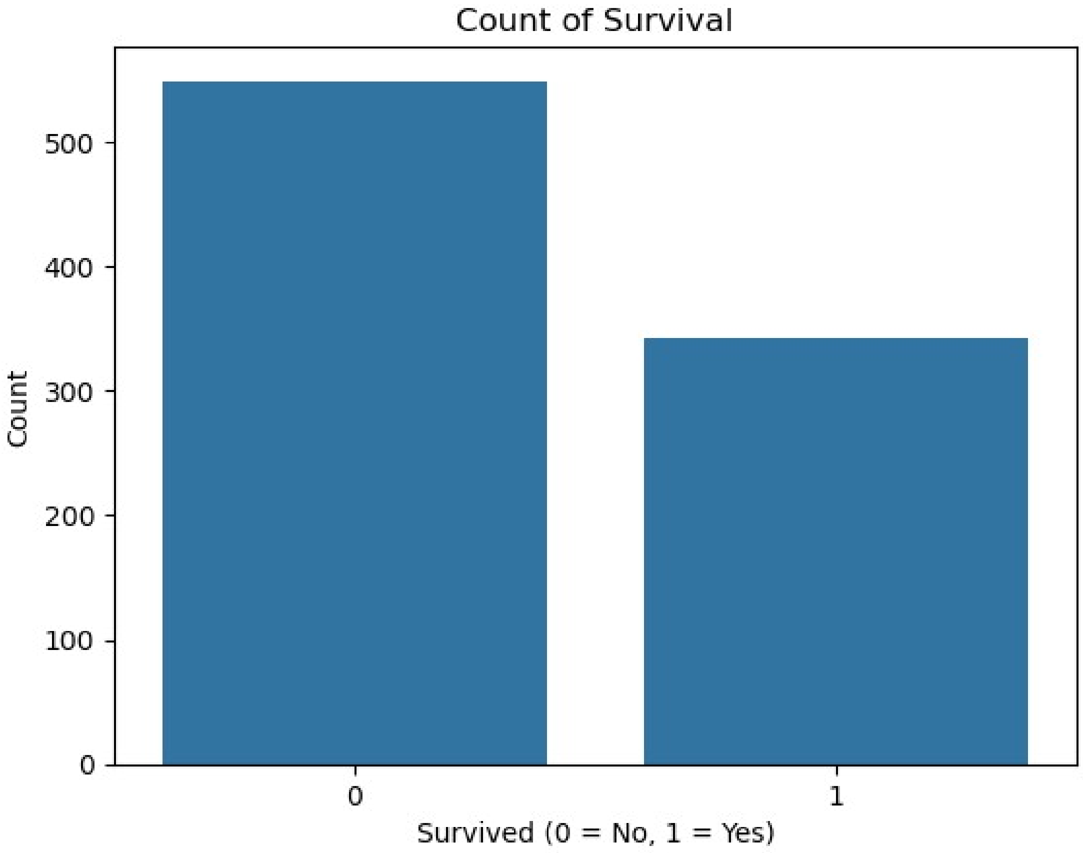
```
       PassengerId    Survived      Pclass         Age       SibSp  \
count   891.000000  891.000000  891.000000  714.000000  891.000000
mean    446.000000    0.383838    2.308642   29.699118    0.523008
```

```
std     257.353842    0.486592    0.836071   14.526497    1.102743
min       1.000000    0.000000    1.000000    0.420000    0.000000
25%     223.500000    0.000000    2.000000   20.125000    0.000000
50%     446.000000    0.000000    3.000000   28.000000    0.000000
75%     668.500000    1.000000    3.000000   38.000000    1.000000
max     891.000000    1.000000    3.000000   80.000000    8.000000

            Parch        Fare
count  891.000000  891.000000
mean     0.381594   32.204208
std      0.806057   49.693429
min      0.000000    0.000000
25%      0.000000    7.910400
50%      0.000000   14.454200
75%      0.000000   31.000000
max      6.000000  512.329200
```

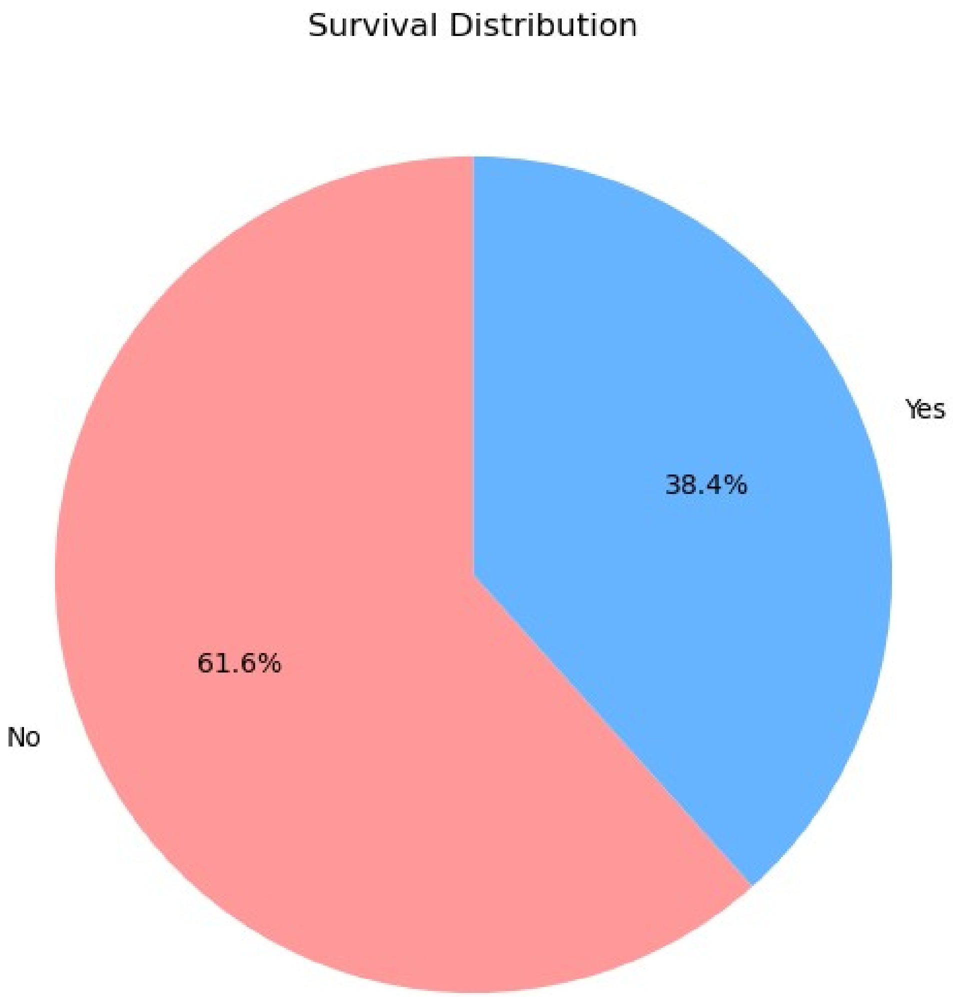
```
train.info()
```

```
<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
```

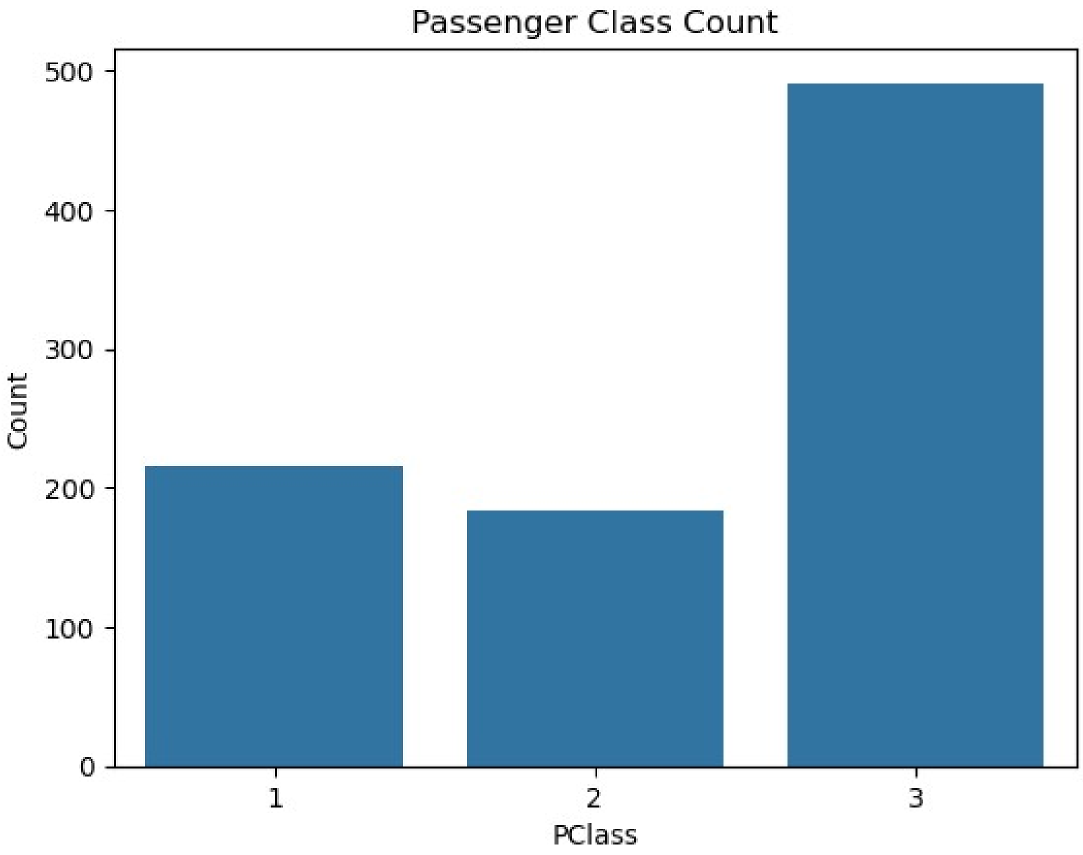
```
df=pd.read_csv('Titanic-Dataset.csv')
train= pd.read_csv('Titanic-Dataset.csv')
sns.countplot(x='Survived', data=train)
plt.title("Count of Survival")
plt.xlabel("Survived (0 = No, 1 = Yes)")
plt.ylabel("Count")
plt.show()
```



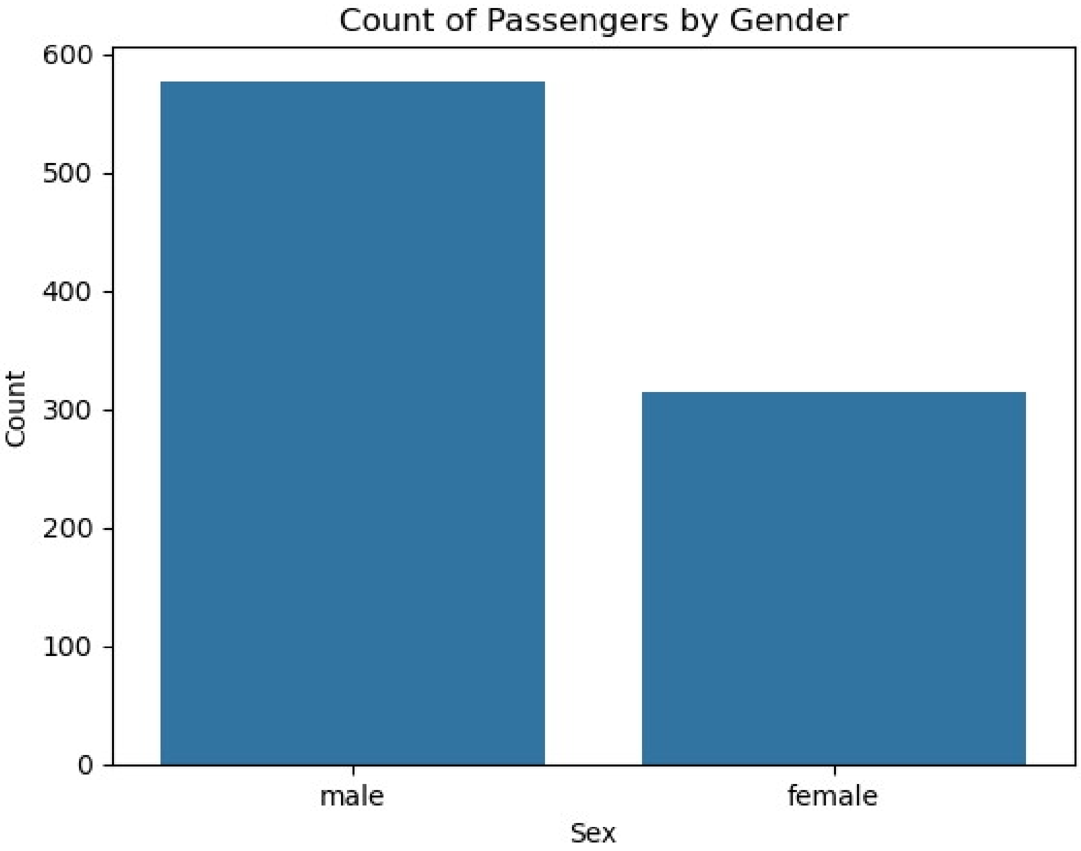
```python
import pandas as pd
import matplotlib.pyplot as plt

# Load the dataset
train = pd.read_csv('Titanic-Dataset.csv')

# Count the occurrences of 'Survived' values (0 and 1)
survival_counts = train['Survived'].value_counts()

# Plot pie chart
plt.figure(figsize=(7, 7))
plt.pie(survival_counts, labels=['No', 'Yes'], autopct='%1.1f%%',
startangle=90, colors=['#FF9999', '#66B3FF'])
plt.title("Survival Distribution")
plt.show()
```



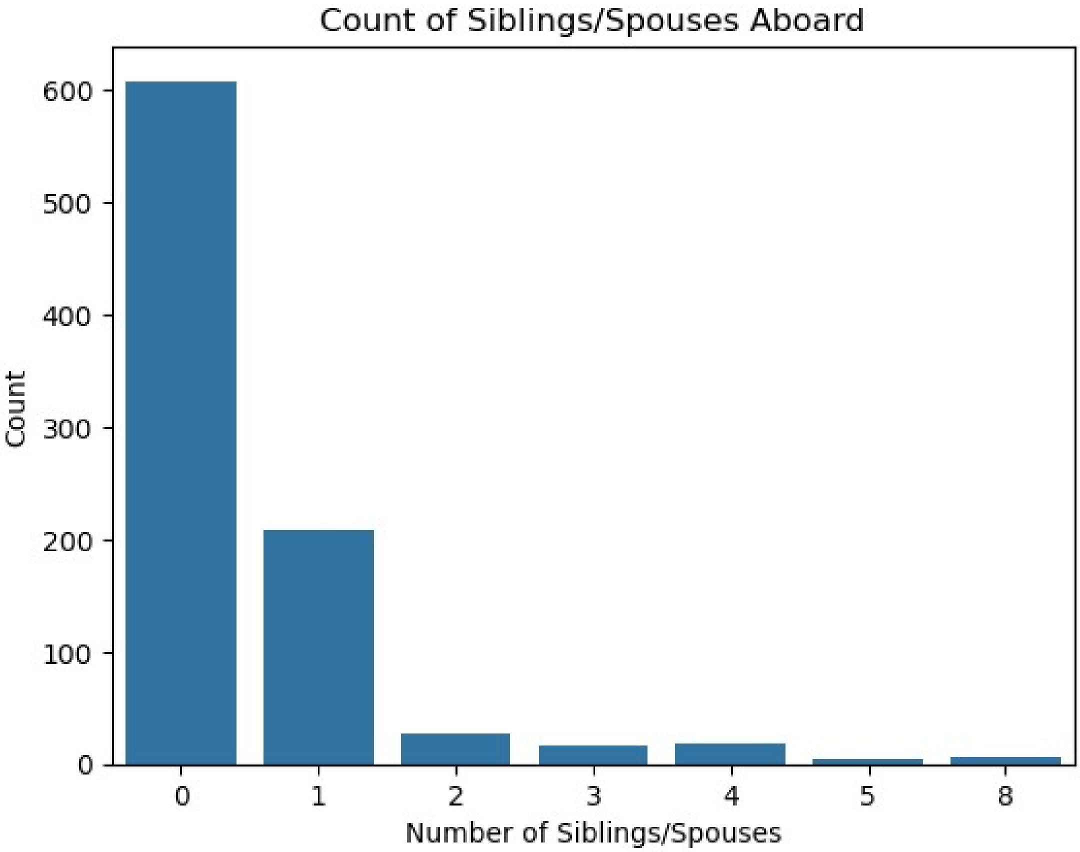
```
df=pd.read_csv('Titanic-Dataset.csv')
train= pd.read_csv('Titanic-Dataset.csv')
sns.countplot(x='Pclass', data=train)
plt.title("Passenger Class Count")
plt.xlabel("PClass")
plt.ylabel("Count")
plt.show()
```



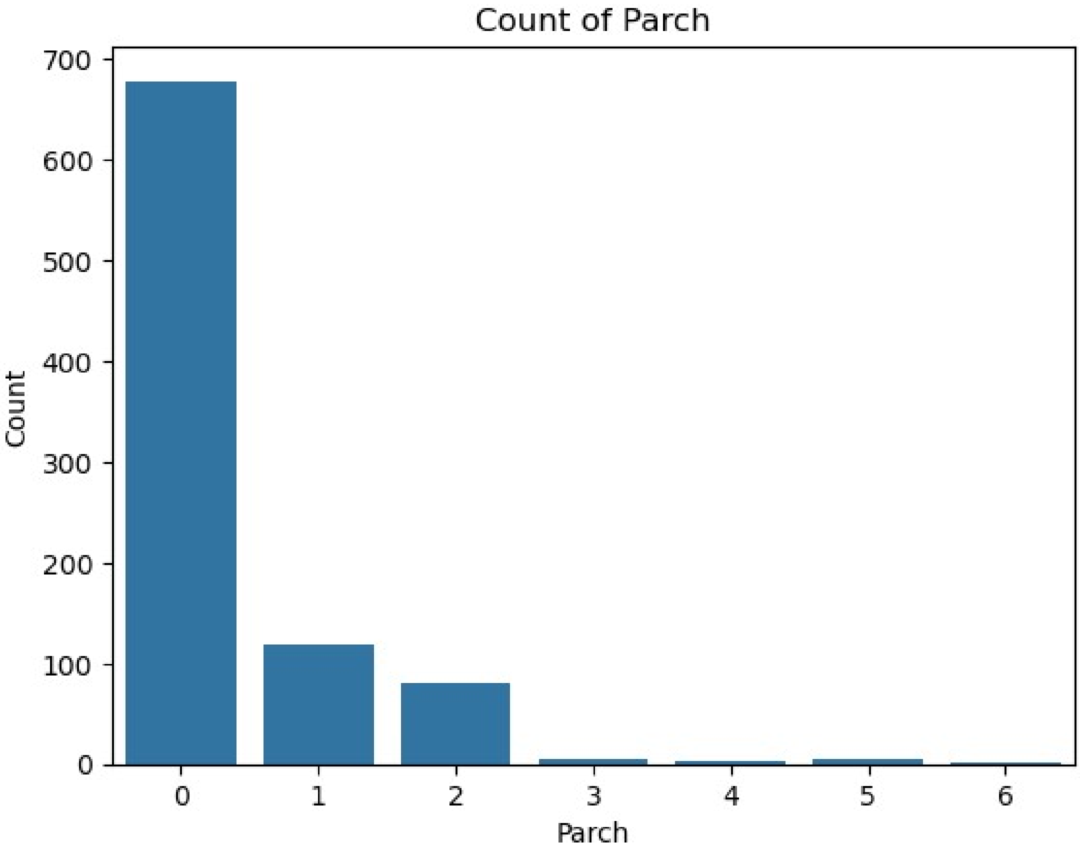
```
train = pd.read_csv('Titanic-Dataset.csv')
sns.countplot(x='Sex', data=train)
plt.title("Count of Passengers by Gender")
plt.xlabel("Sex")
plt.ylabel("Count")
plt.show()
```



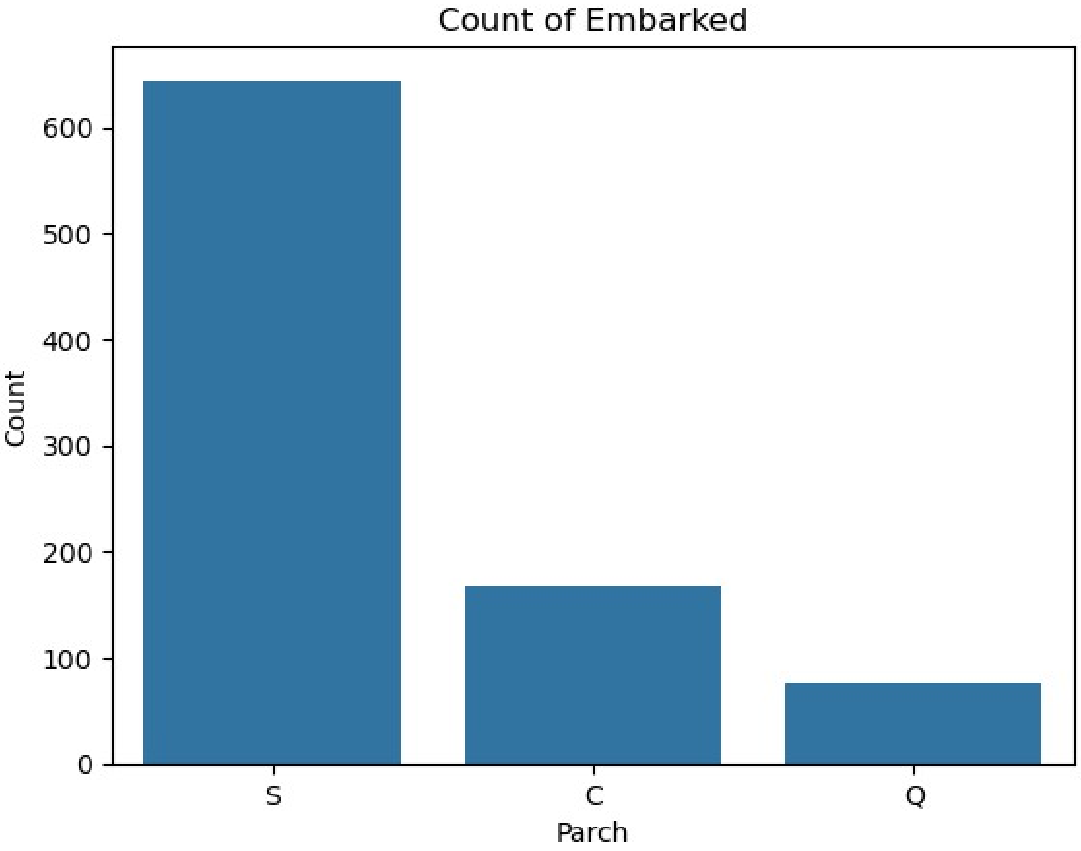
```
train = pd.read_csv('Titanic-Dataset.csv')
sns.countplot(x='SibSp', data=train)
plt.title("Count of Siblings/Spouses Aboard")
plt.xlabel("Number of Siblings/Spouses")
plt.ylabel("Count")
plt.show()
```



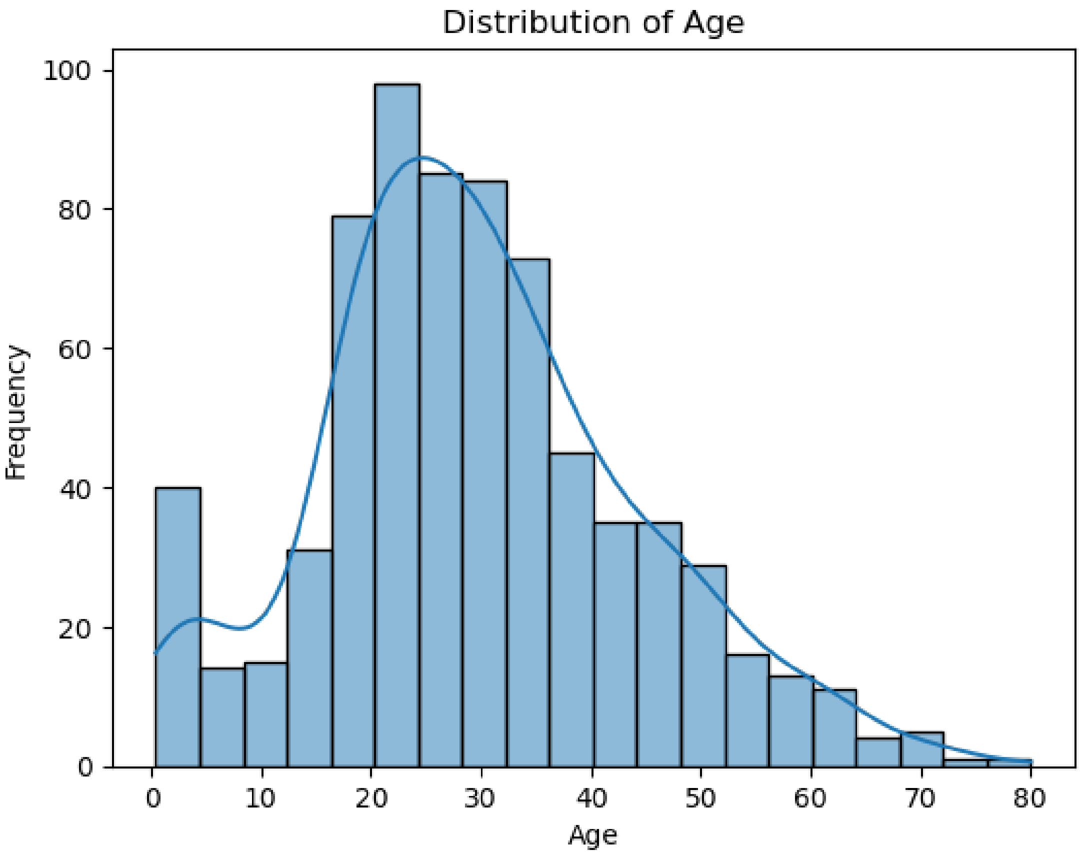
```
train = pd.read_csv('Titanic-Dataset.csv')
sns.countplot(x='Parch', data=train)
plt.title("Count of Parch")
plt.xlabel("Parch")
plt.ylabel("Count")
plt.show()
```



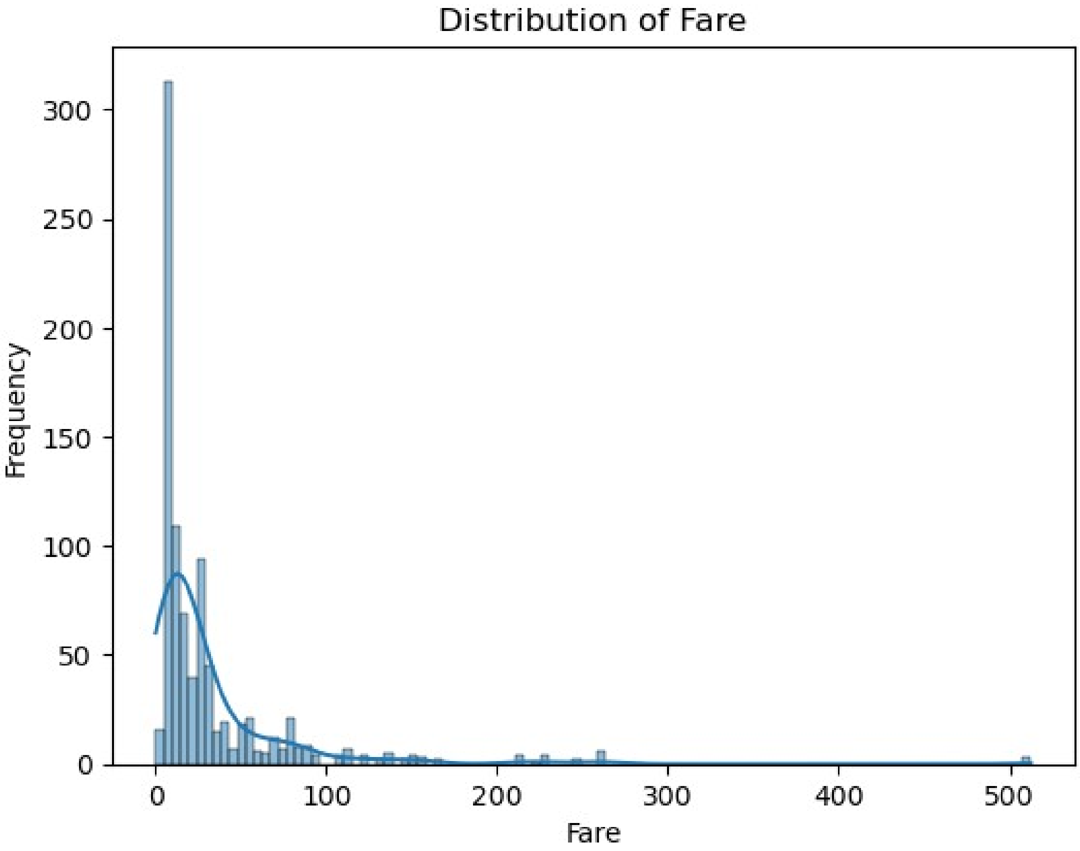
```
train = pd.read_csv('Titanic-Dataset.csv')
sns.countplot(x='Embarked', data=train)
plt.title("Count of Embarked")
plt.xlabel("Parch")
plt.ylabel("Count")
plt.show()
```



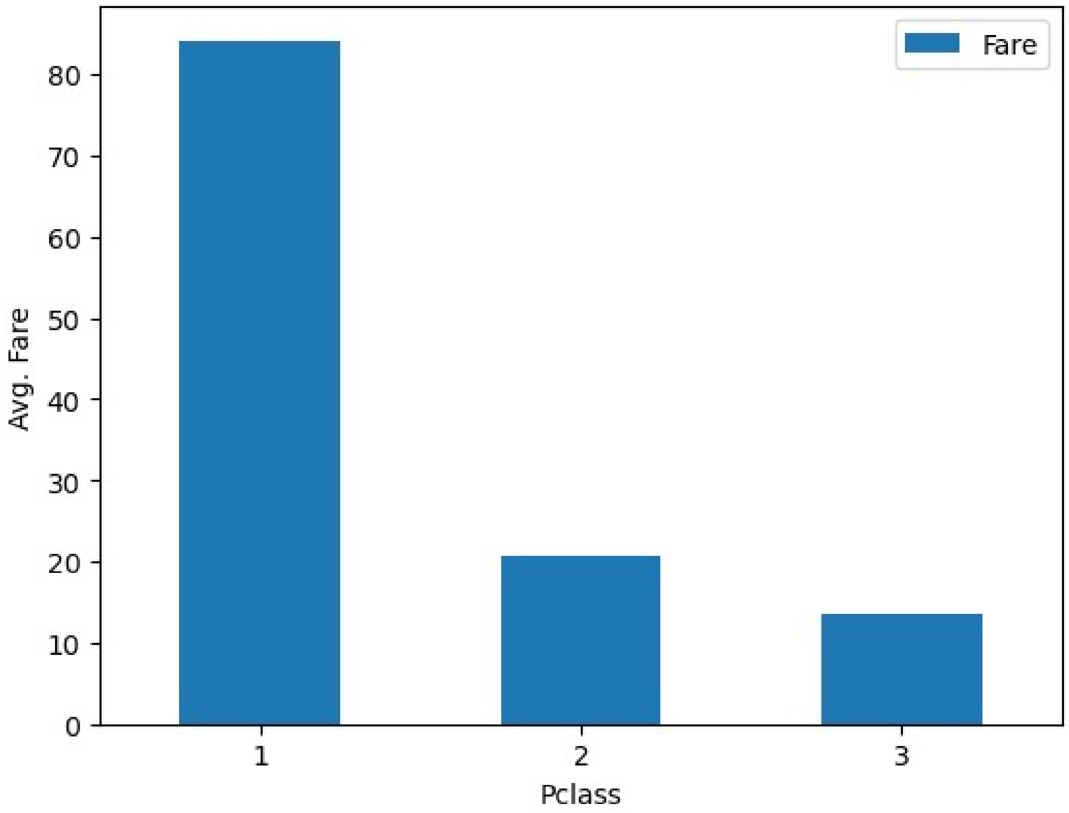
```python
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
train = pd.read_csv('Titanic-Dataset.csv')
sns.histplot(train['Age'], kde=True)
plt.title('Distribution of Age')
plt.xlabel('Age')
plt.ylabel('Frequency')
plt.show()
```



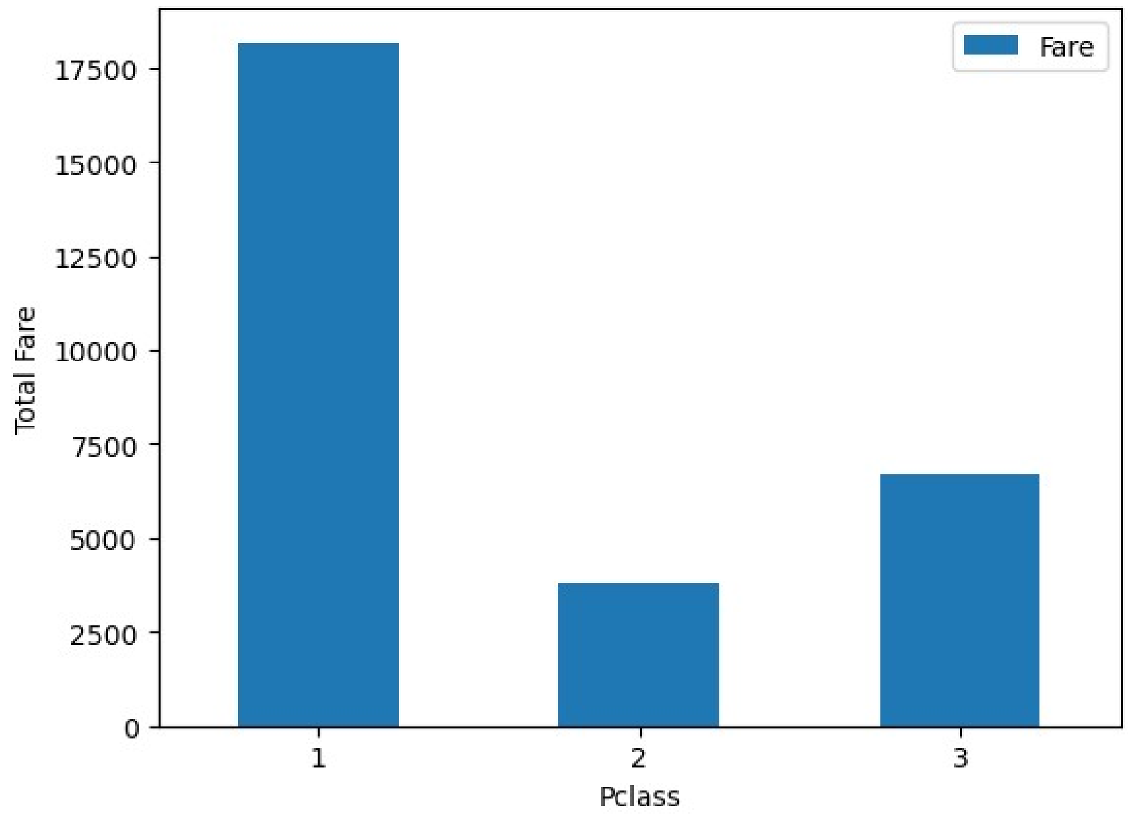
```python
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
train = pd.read_csv('Titanic-Dataset.csv')
sns.histplot(train['Fare'], kde=True)
plt.title('Distribution of Fare')
plt.xlabel('Fare')
plt.ylabel('Frequency')
plt.show()
```



```
class_fare = train.pivot_table(index='Pclass', values='Fare')
class_fare.plot(kind='bar')
plt.xlabel( 'Pclass')
plt.ylabel( 'Avg. Fare')
plt.xticks(rotation=0)
plt. show()
```

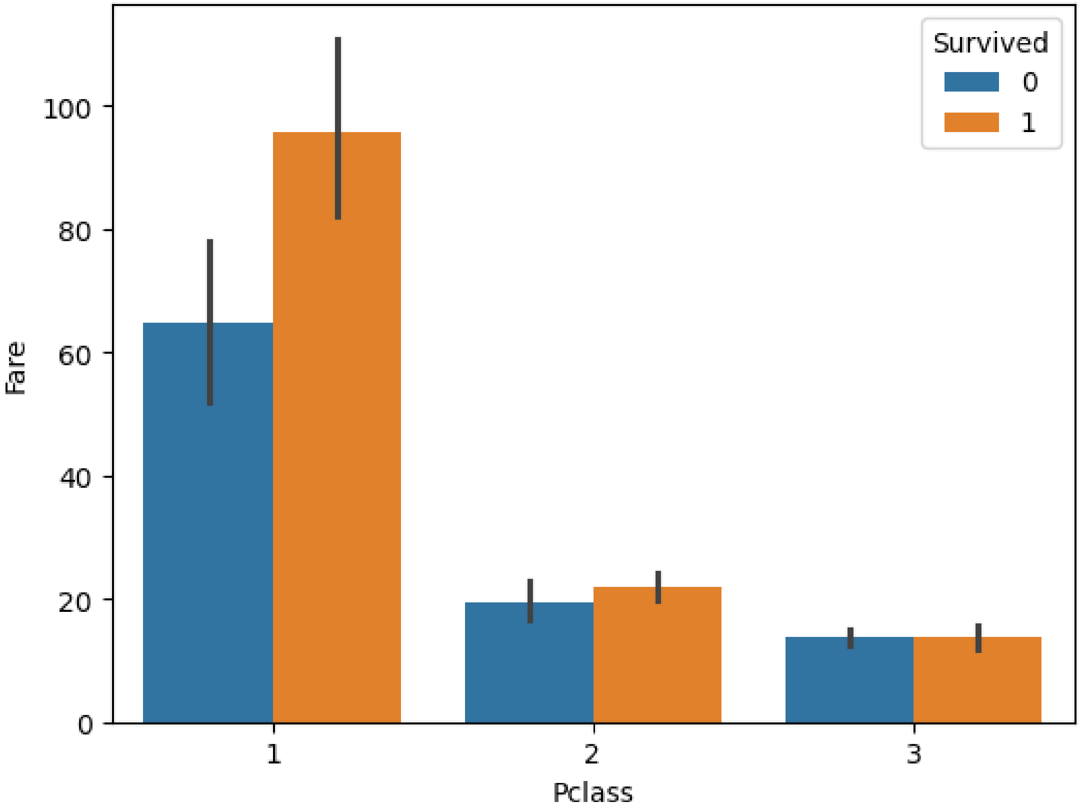


```
class_fare = train.pivot_table(index='Pclass', values='Fare',
aggfunc="sum")
class_fare.plot(kind='bar')
plt.xlabel('Pclass')
plt.ylabel('Total Fare')
plt.xticks(rotation=0)
plt.show()
```



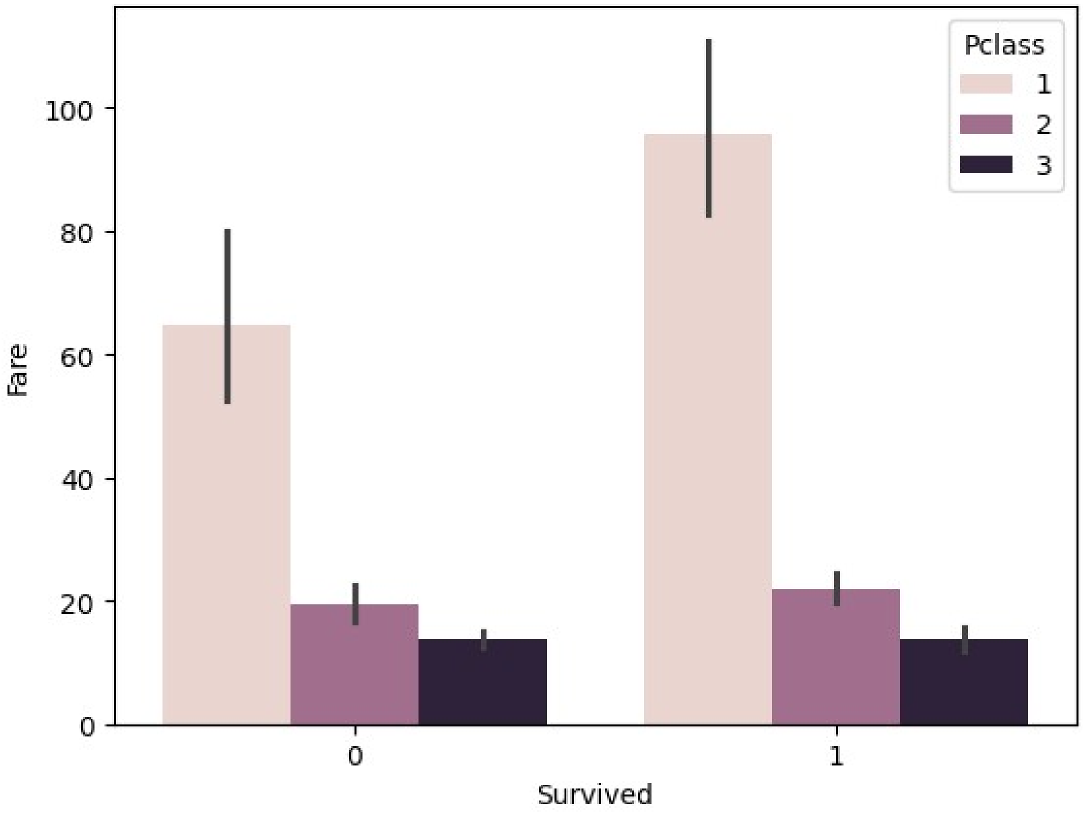
```
sns. barplot(data=train,x='Pclass', y='Fare', hue='Survived')
```

```
<Axes: xlabel='Pclass', ylabel='Fare'>
```



```
sns. barplot(data=train, x='Survived', y='Fare', hue='Pclass' )
```

```
<Axes: xlabel='Survived', ylabel='Fare'>
```



```
import pandas as pd
train = pd.read_csv("Titanic-Dataset.csv")
test = pd.read_csv("Titanic-Dataset.csv")
train_len = len(train)
df = pd.concat([train, test], axis=0)
print(df.head())

   PassengerId  Survived  Pclass  \
0            1         0       3
1            2         1       1
2            3         1       3
3            4         1       1
4            5         0       3

                                                Name     Sex   Age
SibSp  \
0                            Braund, Mr. Owen Harris    male  22.0
1
1  Cumings, Mrs. John Bradley (Florence Briggs Th...  female  38.0
1
2                             Heikkinen, Miss. Laina  female  26.0
0
3       Futrelle, Mrs. Jacques Heath (Lily May Peel)  female  35.0
1
```

```
4                           Allen, Mr. William Henry    male  35.0
0

   Parch            Ticket     Fare Cabin Embarked
0      0         A/5 21171   7.2500   NaN        S
1      0          PC 17599  71.2833   C85        C
2      0  STON/O2. 3101282   7.9250   NaN        S
3      0            113803  53.1000  C123        S
4      0            373450   8.0500   NaN        S
```

```
df.tail()
```

```
     PassengerId  Survived  Pclass
Name  \
886          887         0       2                     Montvila, Rev.
Juozas
887          888         1       1              Graham, Miss. Margaret
Edith
888          889         0       3  Johnston, Miss. Catherine Helen
"Carrie"
889          890         1       1                     Behr, Mr. Karl
Howell
890          891         0       3                       Dooley, Mr.
Patrick

        Sex   Age  SibSp  Parch      Ticket   Fare Cabin Embarked
886    male  27.0      0      0      211536  13.00   NaN        S
887  female  19.0      0      0      112053  30.00   B42        S
888  female   NaN      1      2  W./C. 6607  23.45   NaN        S
889    male  26.0      0      0      111369  30.00  C148        C
890    male  32.0      0      0      370376   7.75   NaN        Q
```

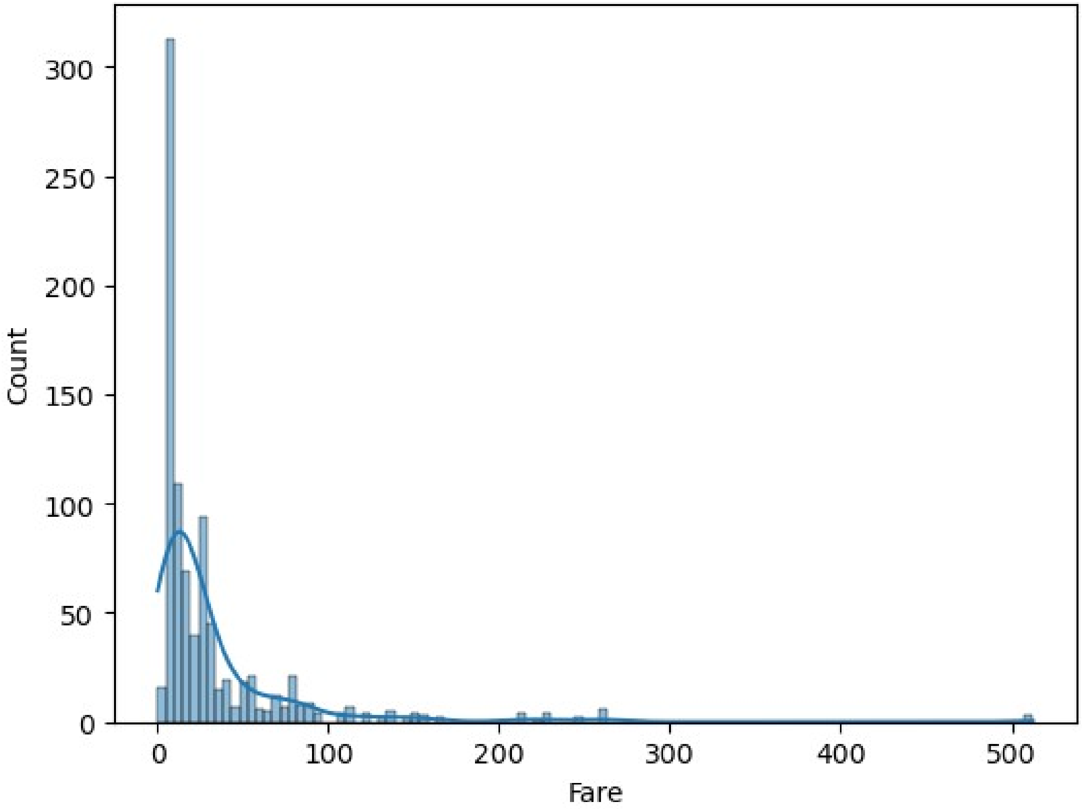
```
df. isnull() .sum()
```

```
PassengerId       0
Survived          0
Pclass            0
Name              0
Sex               0
Age             354
SibSp             0
Parch             0
Ticket            0
Fare              0
Cabin          1374
Embarked          4
dtype: int64
```

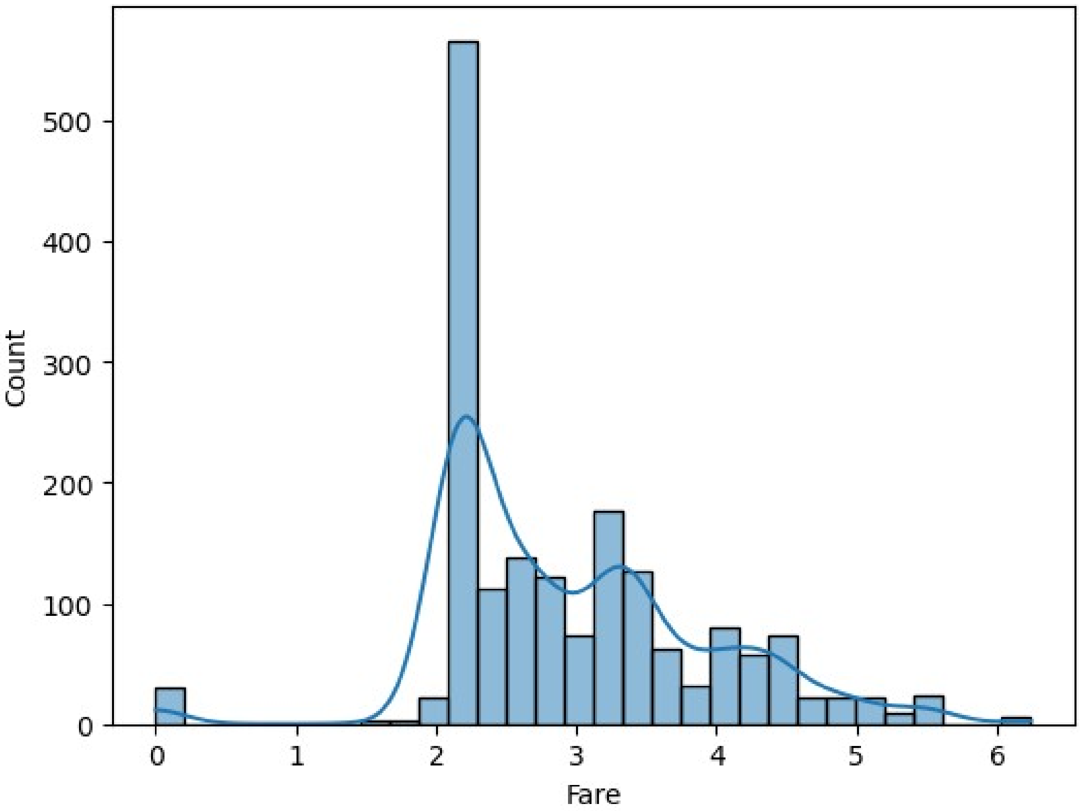
```
df = df. drop(columns=[ 'Cabin' ],axis=1)
```

```
df [ 'Age'] .mean()
```

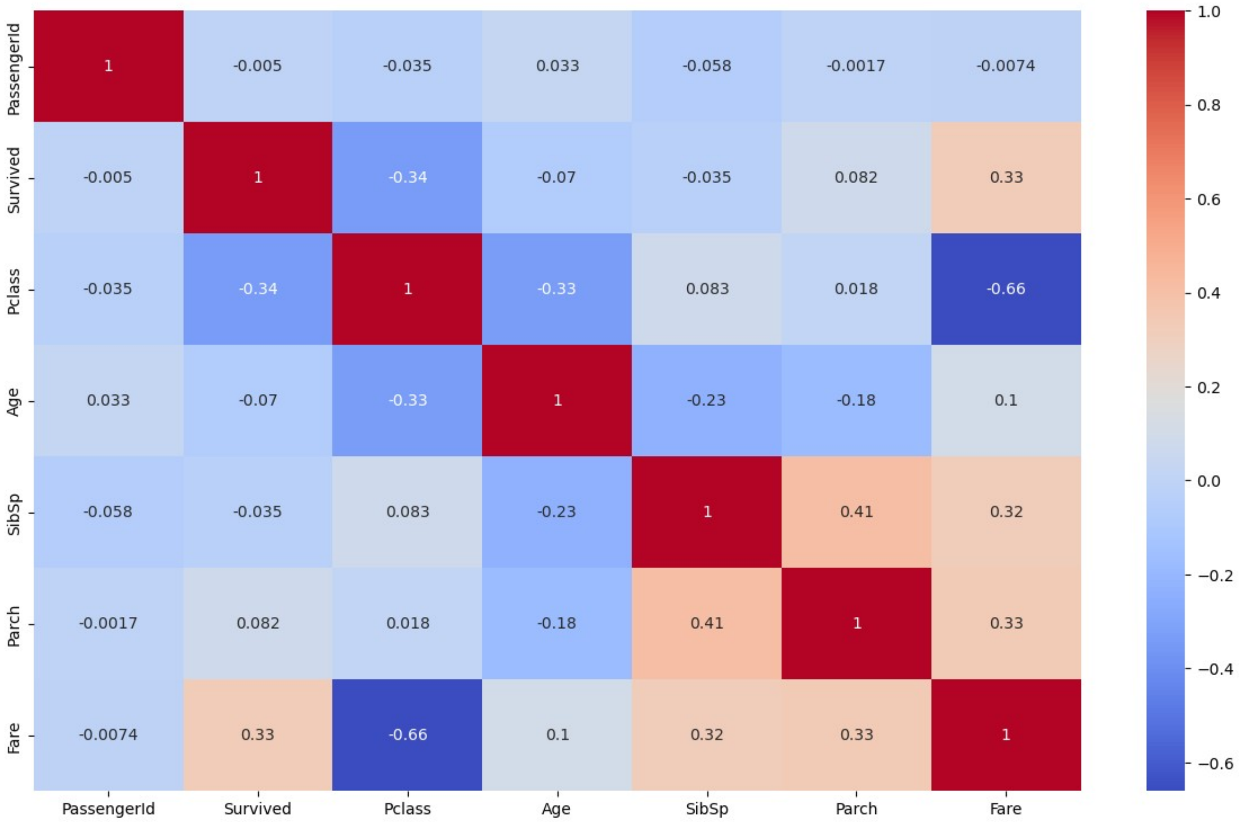
```
29.69911764705882

df['Age'] = df['Age'].fillna(df['Age'].mean())
df['Fare'] = df['Fare'].fillna(df['Fare'].mean())

df [ 'Embarked' ] .mode ()[0]

'S'

df['Embarked'] = df['Embarked'].fillna(df['Embarked'].mode()[0])

sns.histplot(train['Fare'], kde=True)
plt.show()
```



```
df ['Fare'] = np. log(df ['Fare' ]+1)

sns.histplot(df['Fare'], kde=True)
plt.show()
```



```python
import seaborn as sns
import matplotlib.pyplot as plt
numeric_df = df.select_dtypes(include=[float, int])
corr = numeric_df.corr()
plt.figure(figsize=(15, 9))
sns.heatmap(corr, annot=True, cmap='coolwarm')
plt.show()
```



```
df.head()

   PassengerId  Survived  Pclass  \
0            1         0       3
1            2         1       1
2            3         1       3
3            4         1       1
4            5         0       3

                                                Name     Sex   Age
SibSp  \
0                            Braund, Mr. Owen Harris    male  22.0
1
1  Cumings, Mrs. John Bradley (Florence Briggs Th...  female  38.0
1
2                             Heikkinen, Miss. Laina  female  26.0
0
3       Futrelle, Mrs. Jacques Heath (Lily May Peel)  female  35.0
1
4                           Allen, Mr. William Henry    male  35.0
0

   Parch            Ticket      Fare Embarked
0      0         A/5 21171  2.110213        S
1      0          PC 17599  4.280593        C
```

```
2      0  STON/O2. 3101282  2.188856        S
3      0            113803  3.990834        S
4      0            373450  2.202765        S
```

```python
df = df.drop(columns=[col for col in ['Name', 'Ticket'] if col in
df.columns], axis=1)
df.head()
```

```
   PassengerId  Survived  Pclass     Sex   Age  SibSp  Parch      Fare
\
0            1         0       3    male  22.0      1      0  2.110213

1            2         1       1  female  38.0      1      0  4.280593

2            3         1       3  female  26.0      0      0  2.188856

3            4         1       1  female  35.0      1      0  3.990834

4            5         0       3    male  35.0      0      0  2.202765


  Embarked
0        S
1        C
2        S
3        S
4        S
```

```python
from sklearn.preprocessing import LabelEncoder
cols = ['Sex', 'Embarked']

le = LabelEncoder()
for col in cols:
    df[col] = le.fit_transform(df[col])
df.head()
```

```
   PassengerId  Survived  Pclass  Sex   Age  SibSp  Parch      Fare
Embarked
0            1         0       3    1  22.0      1      0  2.110213
2
1            2         1       1    0  38.0      1      0  4.280593
0
2            3         1       3    0  26.0      0      0  2.188856
2
3            4         1       1    0  35.0      1      0  3.990834
2
4            5         0       3    1  35.0      0      0  2.202765
2
```

```python
train = df. iloc[ :train_len,: ]
test = df. iloc[train_len:, :]
```

```
test.head()
```

```
   PassengerId  Survived  Pclass  Sex   Age  SibSp  Parch      Fare  
Embarked
0            1         0       3    1  22.0      1      0  2.110213  
2
1            2         1       1    0  38.0      1      0  4.280593  
0
2            3         1       3    0  26.0      0      0  2.188856  
2
3            4         1       1    0  35.0      1      0  3.990834  
2
4            5         0       3    1  35.0      0      0  2.202765  
2
```

```
X = train.drop(columns=['PassengerId', 'Survived'], axis=1)
y = train['Survived']
```

```
X.head()
```

```
   Pclass  Sex   Age  SibSp  Parch      Fare  Embarked
0       3    1  22.0      1      0  2.110213         2
1       1    0  38.0      1      0  4.280593         0
2       3    0  26.0      0      0  2.188856         2
3       1    0  35.0      1      0  3.990834         2
4       3    1  35.0      0      0  2.202765         2
```

```
from sklearn.model_selection import train_test_split, cross_val_score
import numpy as np
def classify(model, X, y):
    X_train, X_test, Y_train, Y_test = train_test_split(X, y, 
test_size=0.25, random_state=42)
    model.fit(X_train, Y_train)
    print('Accuracy:', model.score(X_test, Y_test))
    score = cross_val_score(model, X, y, cv=5)
    print('CV Score:', np.mean(score))
```

```
from sklearn. linear_model import LogisticRegression
model = LogisticRegression()
classify(model,X,y)
```

```
Accuracy: 0.8071748878923767
CV Score: 0.7833971502102819
```

```
from sklearn.tree import DecisionTreeClassifier
model = DecisionTreeClassifier()
classify(model, X, y)
```

```
Accuracy: 0.726457399103139
CV Score: 0.7699516665620488
```

```
from sklearn.ensemble import RandomForestClassifier
model = RandomForestClassifier()
classify(model, X, y)
```

```
Accuracy: 0.8116591928251121
CV Score: 0.8114933149205952
```

```
from sklearn.ensemble import ExtraTreesClassifier
model = ExtraTreesClassifier()
classify(model, X, y)
```

```
Accuracy: 0.7892376681614349
CV Score: 0.7923921913250893
```

```
pip install lightgbm
```

```
Requirement already satisfied: lightgbm in c:\users\bhara\anaconda3\
lib\site-packages (4.5.0)
Requirement already satisfied: numpy>=1.17.0 in c:\users\bhara\
anaconda3\lib\site-packages (from lightgbm) (1.26.4)
Requirement already satisfied: scipy in c:\users\bhara\anaconda3\lib\
site-packages (from lightgbm) (1.13.1)
Note: you may need to restart the kernel to use updated packages.
```

```
from lightgbm import LGBMClassifier
model = LGBMClassifier ()
classify(model, X, y)
```

```
[LightGBM] [Info] Number of positive: 253, number of negative: 415
[LightGBM] [Info] Auto-choosing row-wise multi-threading, the overhead
of testing was 0.000581 seconds.
You can set `force_row_wise=true` to remove the overhead.
And if memory is not enough, you can set `force_col_wise=true`.
[LightGBM] [Info] Total Bins 191
[LightGBM] [Info] Number of data points in the train set: 668, number
of used features: 7
[LightGBM] [Info] [binary:BoostFromScore]: pavg=0.378743 ->
initscore=-0.494889
[LightGBM] [Info] Start training from score -0.494889
[LightGBM] [Warning] No further splits with positive gain, best gain:
-inf
[LightGBM] [Warning] No further splits with positive gain, best gain:
-inf
[LightGBM] [Warning] No further splits with positive gain, best gain:
-inf
[LightGBM] [Warning] No further splits with positive gain, best gain:
-inf
[LightGBM] [Warning] No further splits with positive gain, best gain:
-inf
[LightGBM] [Warning] No further splits with positive gain, best gain:
-inf
```

```
[LightGBM] [Warning] No further splits with positive gain, best gain:
-inf
[LightGBM] [Warning] No further splits with positive gain, best gain:
-inf
[LightGBM] [Warning] No further splits with positive gain, best gain:
-inf
[LightGBM] [Warning] No further splits with positive gain, best gain:
-inf
[LightGBM] [Warning] No further splits with positive gain, best gain:
-inf
[LightGBM] [Warning] No further splits with positive gain, best gain:
-inf
[LightGBM] [Warning] No further splits with positive gain, best gain:
-inf
[LightGBM] [Warning] No further splits with positive gain, best gain:
-inf
[LightGBM] [Warning] No further splits with positive gain, best gain:
-inf
[LightGBM] [Warning] No further splits with positive gain, best gain:
-inf
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[LightGBM] [Warning] No further splits with positive gain, best gain:
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Accuracy: 0.8116591928251121
[LightGBM] [Info] Number of positive: 273, number of negative: 439
[LightGBM] [Info] Auto-choosing row-wise multi-threading, the overhead
of testing was 0.000183 seconds.
You can set `force_row_wise=true` to remove the overhead.
And if memory is not enough, you can set `force_col_wise=true`.
[LightGBM] [Info] Total Bins 203
[LightGBM] [Info] Number of data points in the train set: 712, number
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of used features: 7
[LightGBM] [Info] [binary:BoostFromScore]: pavg=0.383427 ->
initscore=-0.475028
[LightGBM] [Info] Start training from score -0.475028
[LightGBM] [Warning] No further splits with positive gain, best gain:
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[LightGBM] [Warning] No further splits with positive gain, best gain:
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[LightGBM] [Info] Number of positive: 274, number of negative: 439
[LightGBM] [Info] Auto-choosing col-wise multi-threading, the overhead
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of testing was 0.000485 seconds.
You can set `force_col_wise=true` to remove the overhead.
[LightGBM] [Info] Total Bins 201
[LightGBM] [Info] Number of data points in the train set: 713, number
of used features: 7
[LightGBM] [Info] [binary:BoostFromScore]: pavg=0.384292 ->
initscore=-0.471371
[LightGBM] [Info] Start training from score -0.471371
[LightGBM] [Warning] No further splits with positive gain, best gain:
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[LightGBM] [Warning] No further splits with positive gain, best gain:
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[LightGBM] [Warning] No further splits with positive gain, best gain:
-inf
[LightGBM] [Info] Number of positive: 274, number of negative: 439
[LightGBM] [Info] Auto-choosing row-wise multi-threading, the overhead
of testing was 0.000428 seconds.
You can set `force_row_wise=true` to remove the overhead.
And if memory is not enough, you can set `force_col_wise=true`.
[LightGBM] [Info] Total Bins 204
[LightGBM] [Info] Number of data points in the train set: 713, number
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of used features: 7
[LightGBM] [Info] [binary:BoostFromScore]: pavg=0.384292 ->
initscore=-0.471371
[LightGBM] [Info] Start training from score -0.471371
[LightGBM] [Warning] No further splits with positive gain, best gain:
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[LightGBM] [Warning] No further splits with positive gain, best gain:
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[LightGBM] [Info] Number of positive: 274, number of negative: 439
[LightGBM] [Info] Auto-choosing row-wise multi-threading, the overhead
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of testing was 0.000572 seconds.
You can set `force_row_wise=true` to remove the overhead.
And if memory is not enough, you can set `force_col_wise=true`.
[LightGBM] [Info] Total Bins 202
[LightGBM] [Info] Number of data points in the train set: 713, number
of used features: 7
[LightGBM] [Info] [binary:BoostFromScore]: pavg=0.384292 ->
initscore=-0.471371
[LightGBM] [Info] Start training from score -0.471371
[LightGBM] [Warning] No further splits with positive gain, best gain:
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[LightGBM] [Info] Number of positive: 273, number of negative: 440
[LightGBM] [Info] Auto-choosing row-wise multi-threading, the overhead
of testing was 0.000534 seconds.
You can set `force_row_wise=true` to remove the overhead.
And if memory is not enough, you can set `force_col_wise=true`.
[LightGBM] [Info] Total Bins 202
[LightGBM] [Info] Number of data points in the train set: 713, number
of used features: 7
[LightGBM] [Info] [binary:BoostFromScore]: pavg=0.382889 ->
initscore=-0.477303
[LightGBM] [Info] Start training from score -0.477303
[LightGBM] [Warning] No further splits with positive gain, best gain:
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[LightGBM] [Warning] No further splits with positive gain, best gain:
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[LightGBM] [Warning] No further splits with positive gain, best gain:
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CV Score: 0.8238277572029377
```

```
pip install catboost
```

```
Requirement already satisfied: catboost in c:\users\bhara\anaconda3\
lib\site-packages (1.2.7)
Requirement already satisfied: graphviz in c:\users\bhara\anaconda3\
lib\site-packages (from catboost) (0.20.3)
Requirement already satisfied: matplotlib in c:\users\bhara\anaconda3\
lib\site-packages (from catboost) (3.9.2)
Requirement already satisfied: numpy<2.0,>=1.16.0 in c:\users\bhara\
anaconda3\lib\site-packages (from catboost) (1.26.4)
Requirement already satisfied: pandas>=0.24 in c:\users\bhara\
anaconda3\lib\site-packages (from catboost) (2.2.2)
Requirement already satisfied: scipy in c:\users\bhara\anaconda3\lib\
site-packages (from catboost) (1.13.1)
Requirement already satisfied: plotly in c:\users\bhara\anaconda3\lib\
site-packages (from catboost) (5.24.1)
Requirement already satisfied: six in c:\users\bhara\appdata\roaming\
python\python312\site-packages (from catboost) (1.17.0)
Requirement already satisfied: python-dateutil>=2.8.2 in c:\users\
bhara\appdata\roaming\python\python312\site-packages (from
pandas>=0.24->catboost) (2.9.0.post0)
Requirement already satisfied: pytz>=2020.1 in c:\users\bhara\
anaconda3\lib\site-packages (from pandas>=0.24->catboost) (2024.1)
Requirement already satisfied: tzdata>=2022.7 in c:\users\bhara\
anaconda3\lib\site-packages (from pandas>=0.24->catboost) (2023.3)
Requirement already satisfied: contourpy>=1.0.1 in c:\users\bhara\
anaconda3\lib\site-packages (from matplotlib->catboost) (1.2.0)
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```
Requirement already satisfied: cycler>=0.10 in c:\users\bhara\
anaconda3\lib\site-packages (from matplotlib->catboost) (0.11.0)
Requirement already satisfied: fonttools>=4.22.0 in c:\users\bhara\
anaconda3\lib\site-packages (from matplotlib->catboost) (4.51.0)
Requirement already satisfied: kiwisolver>=1.3.1 in c:\users\bhara\
anaconda3\lib\site-packages (from matplotlib->catboost) (1.4.4)
Requirement already satisfied: packaging>=20.0 in c:\users\bhara\
appdata\roaming\python\python312\site-packages (from matplotlib-
>catboost) (24.2)
Requirement already satisfied: pillow>=8 in c:\users\bhara\anaconda3\
lib\site-packages (from matplotlib->catboost) (10.4.0)
Requirement already satisfied: pyparsing>=2.3.1 in c:\users\bhara\
anaconda3\lib\site-packages (from matplotlib->catboost) (3.1.2)
Requirement already satisfied: tenacity>=6.2.0 in c:\users\bhara\
anaconda3\lib\site-packages (from plotly->catboost) (8.2.3)
Note: you may need to restart the kernel to use updated packages.
```

```
from catboost import CatBoostClassifier
model = CatBoostClassifier (verbose=0)
classify(model, X, y)
```

```
Accuracy: 0.8295964125560538
CV Score: 0.8226790534178645
```

```
model = LGBMClassifier()
model. fit(X, y)
```

```
[LightGBM] [Info] Number of positive: 342, number of negative: 549
[LightGBM] [Info] Auto-choosing col-wise multi-threading, the overhead
of testing was 0.000552 seconds.
You can set `force_col_wise=true` to remove the overhead.
[LightGBM] [Info] Total Bins 222
[LightGBM] [Info] Number of data points in the train set: 891, number
of used features: 7
[LightGBM] [Info] [binary:BoostFromScore]: pavg=0.383838 ->
initscore=-0.473288
[LightGBM] [Info] Start training from score -0.473288
[LightGBM] [Warning] No further splits with positive gain, best gain:
-inf
```

```
LGBMClassifier()
```

```
test.head()
```

```
   PassengerId  Survived  Pclass  Sex   Age  SibSp  Parch      Fare
Embarked
0            1         0       3    1  22.0      1      0  2.110213
2
1            2         1       1    0  38.0      1      0  4.280593
0
2            3         1       3    0  26.0      0      0  2.188856
```

```
2
3            4         1       1    0  35.0      1      0  3.990834
2
4            5         0       3    1  35.0      0      0  2.202765
2
```

```
X_test = train.drop(columns=[ 'PassengerId', 'Survived'], axis=1)
```

```
X_test. head()
```

```
   Pclass  Sex  Age   SibSp  Parch      Fare  Embarked
0       3    1  22.0      1      0  2.110213         2
1       1    0  38.0      1      0  4.280593         0
2       3    0  26.0      0      0  2.188856         2
3       1    0  35.0      1      0  3.990834         2
4       3    1  35.0      0      0  2.202765         2
```

```
pred = model.predict(X_test)
pred
```

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

```
sub = pd. read_csv('Titanic-Dataset.csv')
sub.head()
```

```
   PassengerId  Survived  Pclass  \
0            1         0       3
1            2         1       1
2            3         1       3
3            4         1       1
4            5         0       3

                                                Name     Sex   Age
SibSp  \
0                            Braund, Mr. Owen Harris    male  22.0
1
1  Cumings, Mrs. John Bradley (Florence Briggs Th...  female  38.0
1
2                             Heikkinen, Miss. Laina  female  26.0
0
3       Futrelle, Mrs. Jacques Heath (Lily May Peel)  female  35.0
1
4                           Allen, Mr. William Henry    male  35.0
0

   Parch            Ticket     Fare Cabin Embarked
0      0         A/5 21171   7.2500   NaN        S
1      0          PC 17599  71.2833   C85        C
2      0  STON/O2. 3101282   7.9250   NaN        S
3      0            113803  53.1000  C123        S
4      0            373450   8.0500   NaN        S
```

```
sub.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
```

```
sub[ 'Survived' ] = pred
```

```
sub. head()
```

```
   PassengerId  Survived  Pclass  \
0            1         0       3
1            2         1       1
2            3         1       3
3            4         1       1
4            5         0       3

                                                Name     Sex   Age  
SibSp  \
0                            Braund, Mr. Owen Harris    male  22.0
1
1  Cumings, Mrs. John Bradley (Florence Briggs Th...  female  38.0
1
2                             Heikkinen, Miss. Laina  female  26.0
0
3       Futrelle, Mrs. Jacques Heath (Lily May Peel)  female  35.0
1
4                           Allen, Mr. William Henry    male  35.0
0

   Parch            Ticket     Fare Cabin Embarked
0      0         A/5 21171   7.2500   NaN        S
1      0          PC 17599  71.2833   C85        C
2      0  STON/O2. 3101282   7.9250   NaN        S
3      0            113803  53.1000  C123        S
4      0            373450   8.0500   NaN        S
```

```
sub.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
```

```
sub.head()
```

```
   PassengerId  Survived  Pclass  \
0            1         0       3
1            2         1       1
2            3         1       3
3            4         1       1
4            5         0       3

                                                Name     Sex   Age
SibSp  \
0                            Braund, Mr. Owen Harris    male  22.0
1
1  Cumings, Mrs. John Bradley (Florence Briggs Th...  female  38.0
1
2                             Heikkinen, Miss. Laina  female  26.0
0
3       Futrelle, Mrs. Jacques Heath (Lily May Peel)  female  35.0
1
4                           Allen, Mr. William Henry    male  35.0
0

   Parch            Ticket     Fare Cabin Embarked
0      0         A/5 21171   7.2500   NaN        S
1      0          PC 17599  71.2833   C85        C
2      0  STON/O2. 3101282   7.9250   NaN        S
3      0            113803  53.1000  C123        S
4      0            373450   8.0500   NaN        S
```

```
sub.to_csv('submission.csv', index=False)
```

```
import matplotlib.pyplot as plt



# Calculate the counts for each category in 'Sex'

sex_counts = train['Sex'].value_counts()



# Create a pie chart

plt.figure(figsize=(8, 6))
plt.pie(sex_counts, labels=sex_counts.index,

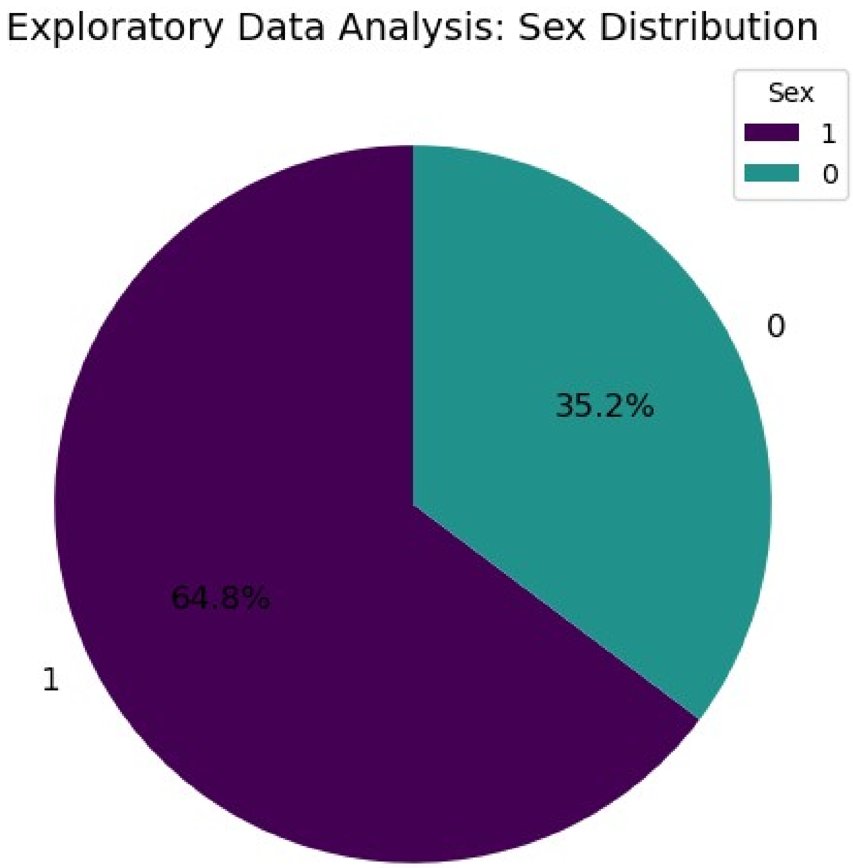
        autopct='%1.1f%%', startangle=90,

        colors=['#440154', '#21918c'], textprops={'fontsize': 12})

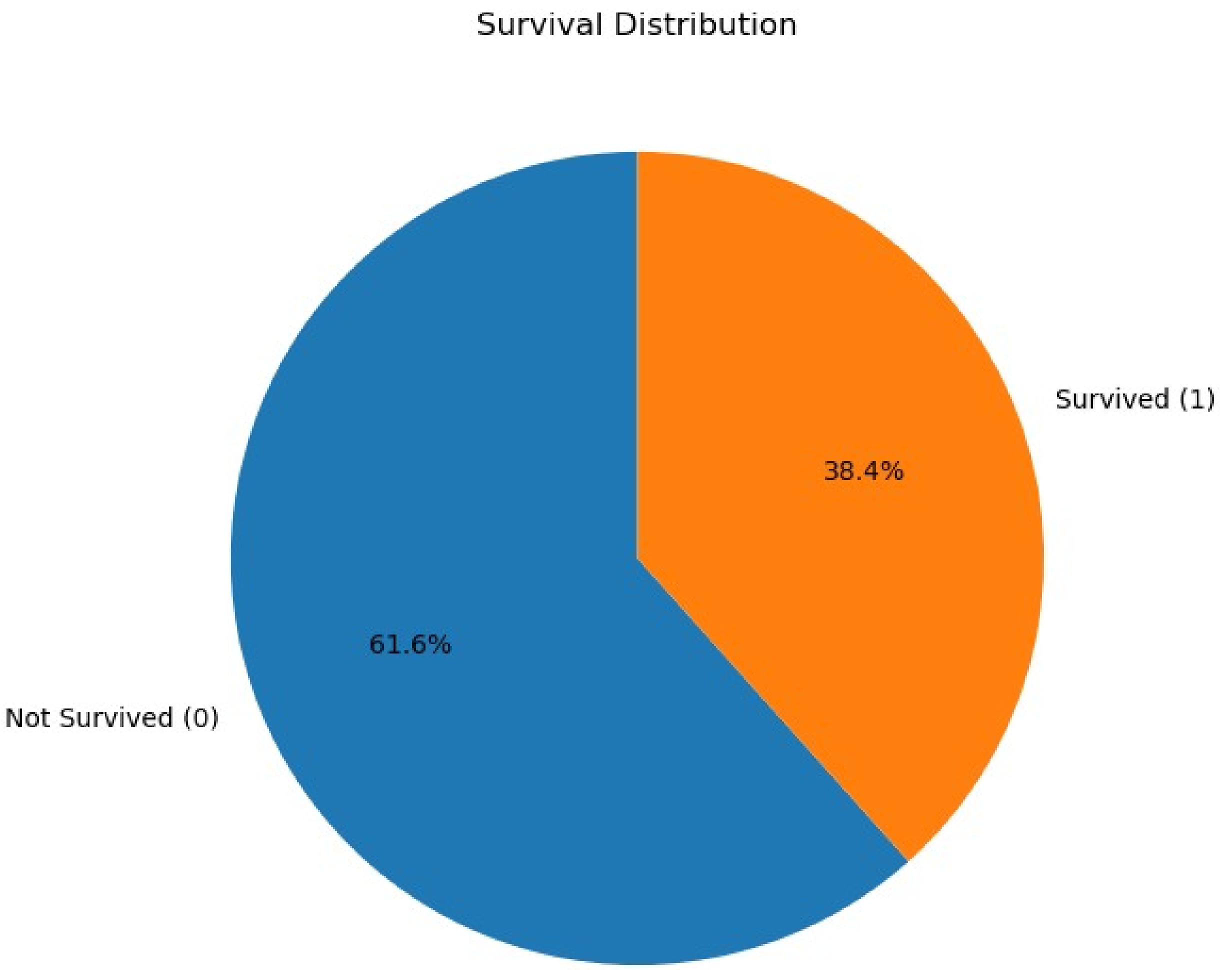
plt.title("Exploratory Data Analysis: Sex Distribution", fontsize=14)

plt.legend(title="Sex", loc="upper right", fontsize=10)

plt.show()
```



```
survival_counts = df['Survived'].value_counts()
plt.figure(figsize=(7, 7))
plt.pie(survival_counts, labels=['Not Survived (0)', 'Survived (1)'],
autopct='%1.1f%%', startangle=90)
plt.title("Survival Distribution")
plt.ylabel("")
plt.show()
```



```
df.info()

<class 'pandas.core.frame.DataFrame'>
Index: 1782 entries, 0 to 890
Data columns (total 9 columns):
 #   Column       Non-Null Count  Dtype
---  ------       --------------  -----
 0   PassengerId  1782 non-null   int64
 1   Survived     1782 non-null   int64
 2   Pclass       1782 non-null   int64
 3   Sex          1782 non-null   int32
 4   Age          1782 non-null   float64
 5   SibSp        1782 non-null   int64
 6   Parch        1782 non-null   int64
 7   Fare         1782 non-null   float64
 8   Embarked     1782 non-null   int32
```

```
dtypes: float64(2), int32(2), int64(5)
memory usage: 125.3 KB
```

```
import pandas as pd
f=pd.read_csv("train.csv")
f
```

```
     PassengerId  Survived  Pclass  \
0              1         0       3
1              2         1       1
2              3         1       3
3              4         1       1
4              5         0       3
..           ...       ...     ...
886          887         0       2
887          888         1       1
888          889         0       3
889          890         1       1
890          891         0       3

                                                   Name     Sex   Age
SibSp  \
0                               Braund, Mr. Owen Harris    male  22.0
1
1     Cumings, Mrs. John Bradley (Florence Briggs Th...  female  38.0
1
2                                Heikkinen, Miss. Laina  female  26.0
0
3          Futrelle, Mrs. Jacques Heath (Lily May Peel)  female  35.0
1
4                              Allen, Mr. William Henry    male  35.0
0
..                                                  ...     ...   ...
...
886                               Montvila, Rev. Juozas    male  27.0
0
887                        Graham, Miss. Margaret Edith  female  19.0
0
888            Johnston, Miss. Catherine Helen "Carrie"  female   NaN
1
889                               Behr, Mr. Karl Howell    male  26.0
0
890                                 Dooley, Mr. Patrick    male  32.0
0

     Parch            Ticket     Fare Cabin Embarked
0        0         A/5 21171   7.2500   NaN         S
1        0          PC 17599  71.2833   C85         C
2        0  STON/O2. 3101282   7.9250   NaN         S
3        0            113803  53.1000  C123         S
```

```
4        0            373450   8.0500   NaN        S
..     ...               ...      ...   ...      ...
886      0            211536  13.0000   NaN        S
887      0            112053  30.0000   B42        S
888      2        W./C. 6607  23.4500   NaN        S
889      0            111369  30.0000  C148        C
890      0            370376   7.7500   NaN        Q

[891 rows x 12 columns]
```

```
f.info()
```

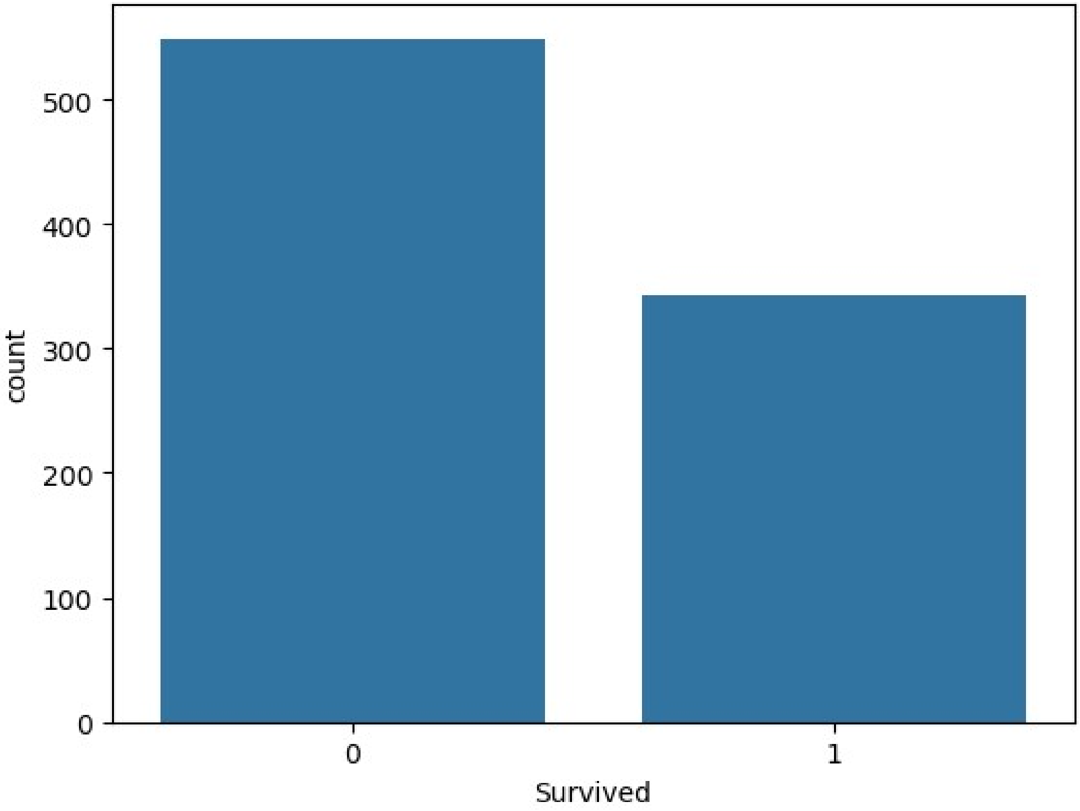
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
Data columns (total 12 columns):
 #   Column       Non-Null Count  Dtype  
---  ------       --------------  -----  
 0   PassengerId  891 non-null    int64  
 1   Survived     891 non-null    int64  
 2   Pclass       891 non-null    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
```

```
f.isnull().sum()
```

```
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
```

```
import seaborn as sns
sns.countplot(x="Survived",data=f)
```

```
<Axes: xlabel='Survived', ylabel='count'>
```



```
survival_counts = f.groupby(["Pclass", "Survived"]).size().unstack()
print(survival_counts)
```

```
Survived    0    1
Pclass
1          80  136
2          97   87
3         372  119
```

```
# Check missing values in Class 1 grouped by Sex
missing_counts = f[f["Pclass"] == 1].isnull().sum()

# Count missing values separately for male and female passengers
missing_by_sex = f[f["Pclass"] == 1].groupby("Sex").apply(lambda x:
x.isnull().sum())

print("Total Missing Values in Class 1:\n", missing_counts)
print("\nMissing Values in Class 1 by Sex:\n", missing_by_sex)
```

```
Total Missing Values in Class 1:
 PassengerId     0
Survived        0
Pclass          0
Name            0
Sex             0
Age            30
SibSp           0
Parch           0
Ticket          0
Fare            0
Cabin          40
Embarked        2
dtype: int64

Missing Values in Class 1 by Sex:
         PassengerId  Survived  Pclass  Name  Sex  Age  SibSp  Parch  
Ticket  \
Sex

female            0         0       0     0    0    9      0      0
0
male              0         0       0     0    0   21      0      0
0

        Fare  Cabin  Embarked
Sex
female     0     13         2
male       0     27         0
```

```
surviving_men_class1 = f[(f["Pclass"] == 1) & (f["Sex"] == "male") &
(f["Survived"] == 1)]


count_surviving_men_class1 = surviving_men_class1.shape[0]

print("Number of surviving men in Class 1:",
count_surviving_men_class1)
```

```
Number of surviving men in Class 1: 45
```

```
surviving = f[(f["Survived"] == 1)&(f["Age"]==47)]
count_surviving= surviving.shape[0]
print("Number of surviving :", count_surviving)
```

```
Number of surviving : 1
```

```
surviving_men_class2 = f[(f["Pclass"] == 2)  & (f["Survived"] == 1)]
```

```
print("Number of surviving men in Class 2:",
count_surviving_men_class)
```

```
Number of surviving men in Class 2: 136
```

```
a = df[df["Survived"] == 1]
```

```
b = a[a["Pclass"] == 1]
```

```
b.Age.value_counts()
```

```
Age
29.699118    28
35.000000    18
36.000000    14
48.000000    10
24.000000    10
30.000000    10
38.000000     8
39.000000     8
49.000000     8
22.000000     8
17.000000     6
27.000000     6
52.000000     6
33.000000     6
42.000000     6
18.000000     6
16.000000     6
19.000000     6
58.000000     6
31.000000     6
40.000000     6
23.000000     6
45.000000     4
51.000000     4
56.000000     4
21.000000     4
28.000000     4
54.000000     4
50.000000     4
26.000000     4
44.000000     4
25.000000     4
60.000000     4
32.000000     4
14.000000     2
```

```
15.000000     2
62.000000     2
11.000000     2
43.000000     2
0.920000      2
29.000000     2
37.000000     2
63.000000     2
80.000000     2
4.000000      2
53.000000     2
41.000000     2
34.000000     2
47.000000     2
Name: count, dtype: int64
```

```python
a = df[df["Survived"] == 0]


b = a[a["Pclass"] == 3]


b["Sex"].value_counts()
```

```
Sex
1    600
0    144
Name: count, dtype: int64
```

```python
# Filter for passengers who did not survive (died)
a = df[df["Survived"] == 0]

# Further filter for passengers in third class (Pclass = 3)
b = a[a["Pclass"] == 3]

# Count the number of females
num_female_died = b[b["Sex"] == "female"].shape[0]

print(f"Number of female passengers who died in third class:
{num_female_died}")
```

```
Number of female passengers who died in third class: 0
```