TASK 2 - EDA

In [ ]:
```
# Import necessary libraries
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

In [4]:
```
# Load the datasets
train = pd.read_csv('C:\\Users\\reshm\\Downloads\\train.csv')
test = pd.read_csv('C:\\Users\\reshm\\Downloads\\test.csv')
gender_submission = pd.read_csv('C:\\Users\\reshm\\Downloads\\gender_submis
```

In [5]:
```
# Display the first few rows of each dataset
print(train.head())
print(test.head())
print(gender_submission.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
   PassengerId  Pclass                                          Name     S
ex  \
0          892       3                              Kelly, Mr. James    ma
le
1          893       3              Wilkes, Mrs. James (Ellen Needs)  fema
le
2          894       2                     Myles, Mr. Thomas Francis    ma
le
3          895       3                              Wirz, Mr. Albert    ma
le
4          896       3  Hirvonen, Mrs. Alexander (Helga E Lindqvist)  fema
le

    Age  SibSp  Parch   Ticket     Fare Cabin Embarked
0  34.5      0      0   330911   7.8292   NaN        Q
1  47.0      1      0   363272   7.0000   NaN        S
2  62.0      0      0   240276   9.6875   NaN        Q
3  27.0      0      0   315154   8.6625   NaN        S
4  22.0      1      1  3101298  12.2875   NaN        S
   PassengerId  Survived
0          892         0
1          893         1
2          894         0
3          895         0
4          896         1
```

In [6]:
```
# Display summary statistics of the training dataset
print(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
```

In [7]:
```
# Display information about the training dataset
print(train.info())
```

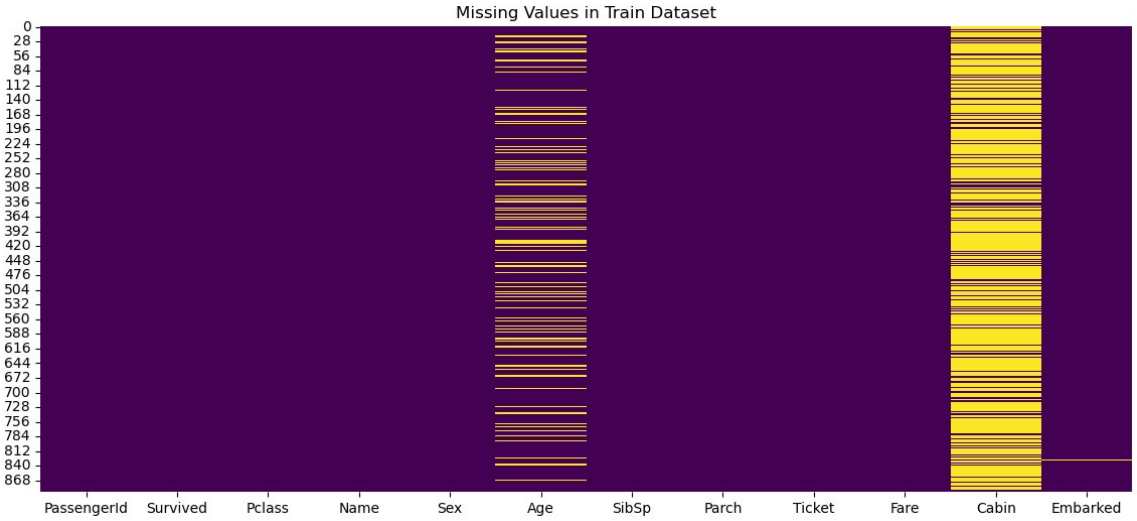
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
Data columns (total 12 columns):
 #   Column       Non-Null Count  Dtype  
---  ------       --------------  -----  
 0   PassengerId  891 non-null    int64  
 1   Survived     891 non-null    int64  
 2   Pclass       891 non-null    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
None
```

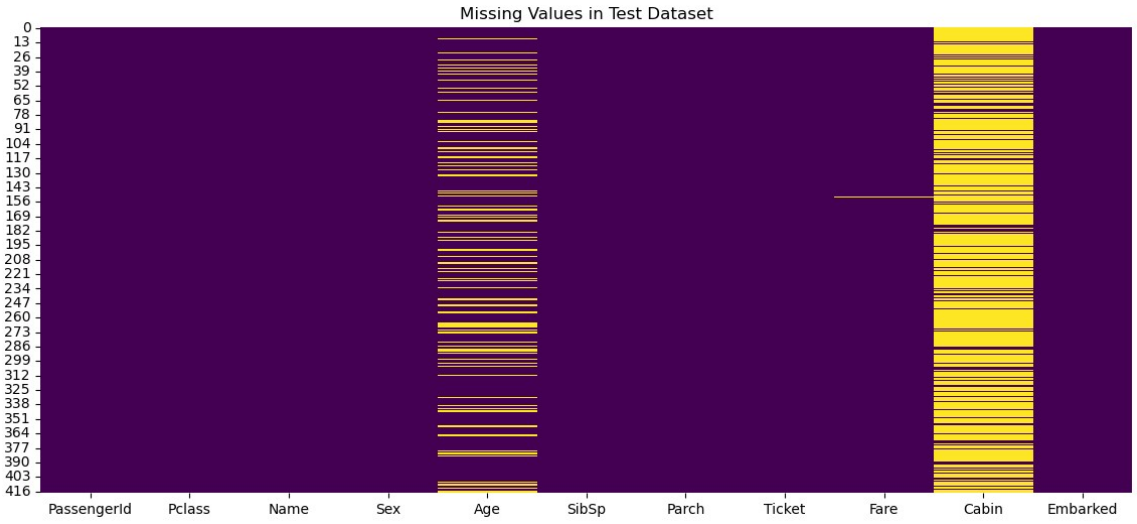
In [8]:
```
# Check for missing values in train and test datasets
print(train.isnull().sum())
print(test.isnull().sum())
```

```
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
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 [9]:
```
# Visualize missing values in the train and test datasets
plt.figure(figsize=(14, 6))
sns.heatmap(train.isnull(), cbar=False, cmap='viridis')
plt.title('Missing Values in Train Dataset')
plt.show()

plt.figure(figsize=(14, 6))
sns.heatmap(test.isnull(), cbar=False, cmap='viridis')
plt.title('Missing Values in Test Dataset')
plt.show()
```

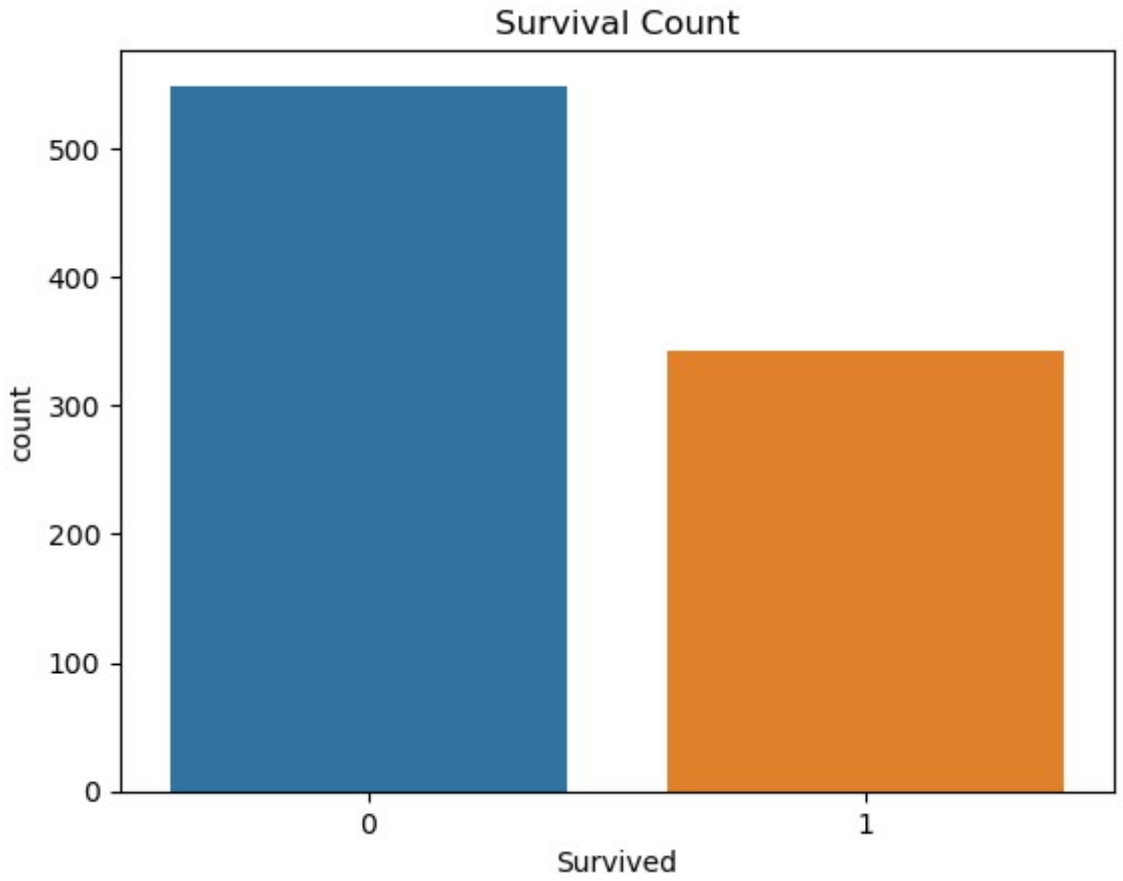




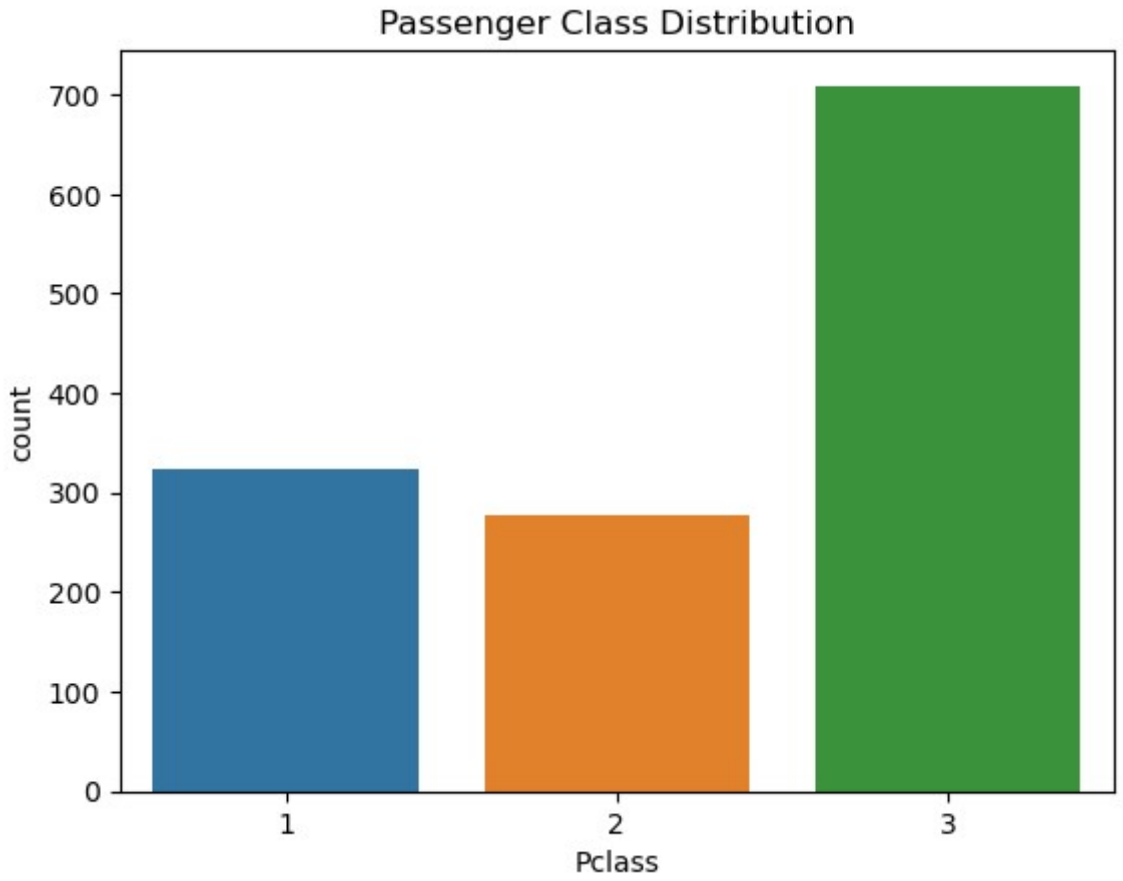
In [10]:
```
# Combine train and test datasets for unified analysis
combined = pd.concat([train, test], sort=False)
```

Univariate Analysis

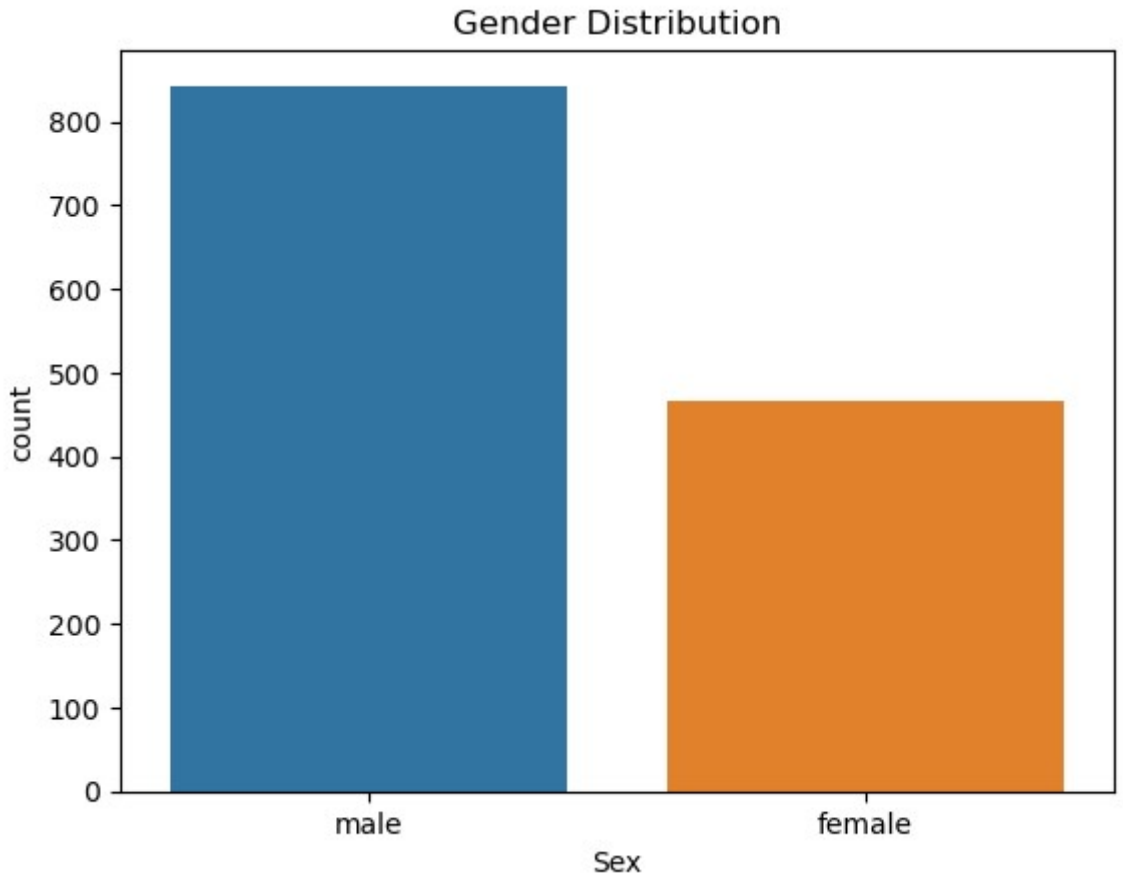
In [28]:
```
# Plot the distribution of the 'Survived' variable
sns.countplot(x='Survived', data=train)
plt.title('Survival Count')
plt.show()
```



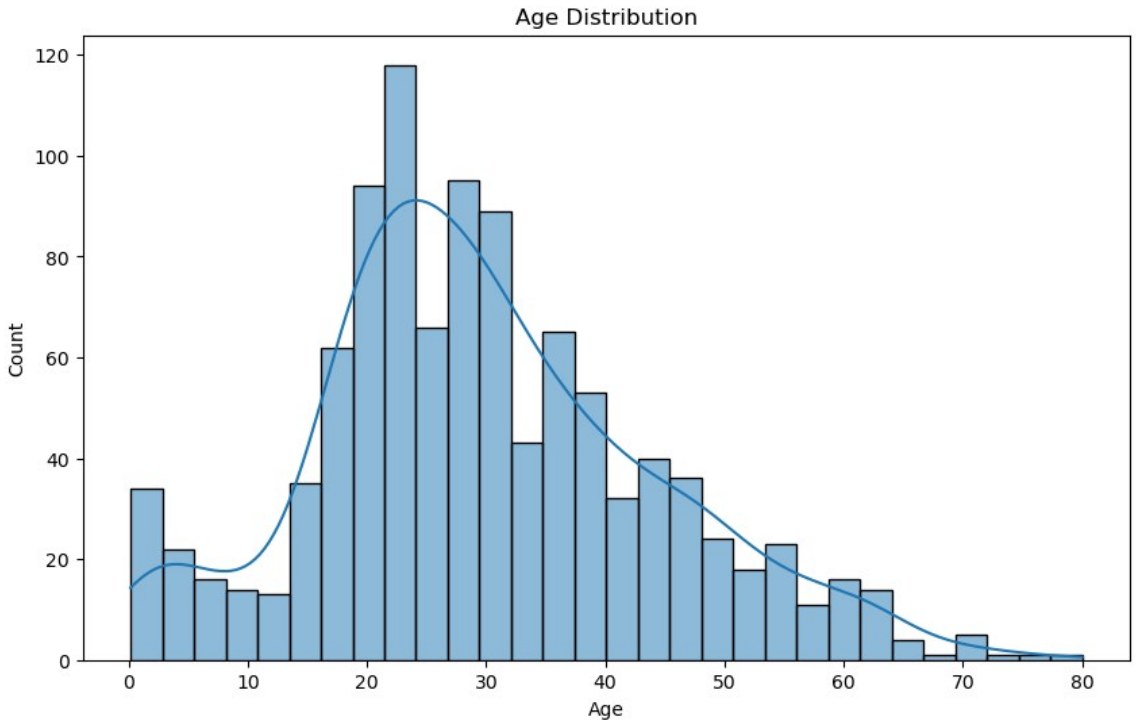
In [29]:
```
# Plot the distribution of the 'Pclass' variable
sns.countplot(x='Pclass', data=combined)
plt.title('Passenger Class Distribution')
plt.show()
```



In [30]:
```
# Plot the distribution of the 'Sex' variable
sns.countplot(x='Sex', data=combined)
plt.title('Gender Distribution')
plt.show()
```

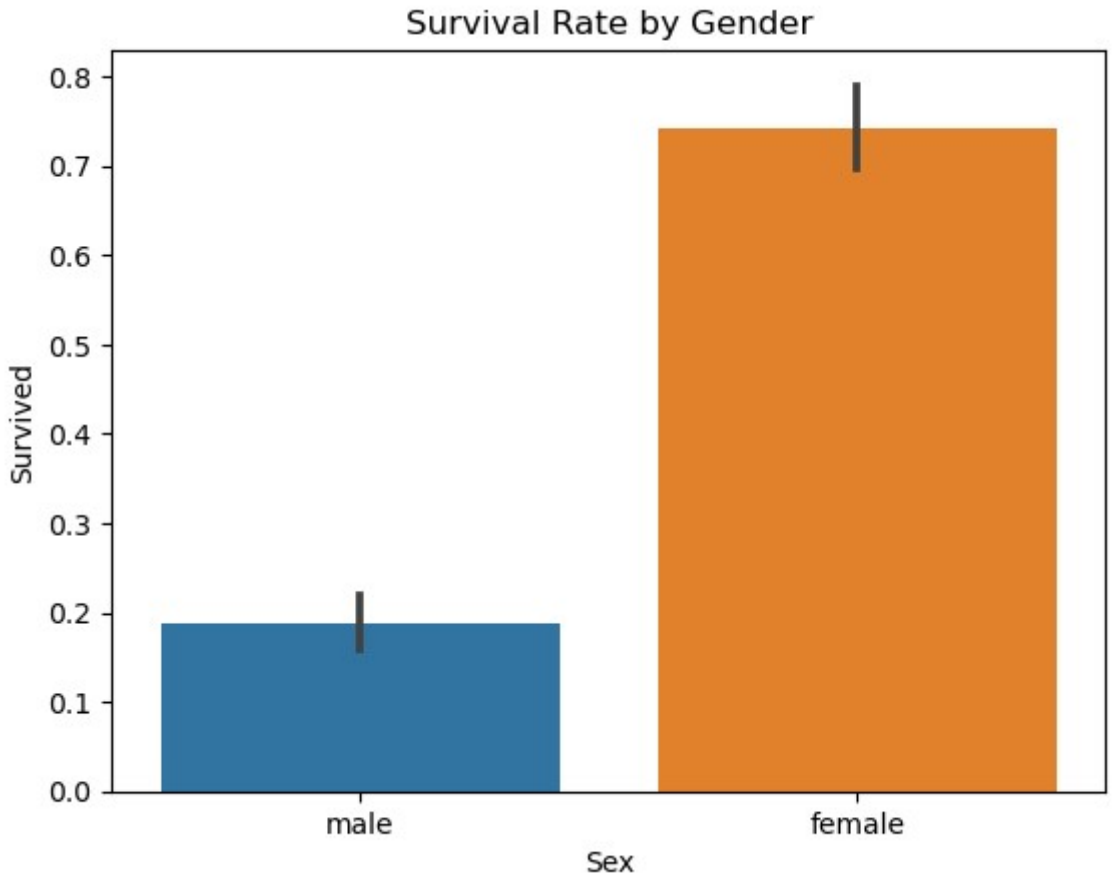


In [31]:
```
# Plot the distribution of the 'Age' variable
plt.figure(figsize=(10, 6))
sns.histplot(combined['Age'].dropna(), bins=30, kde=True)
plt.title('Age Distribution')
plt.show()
```

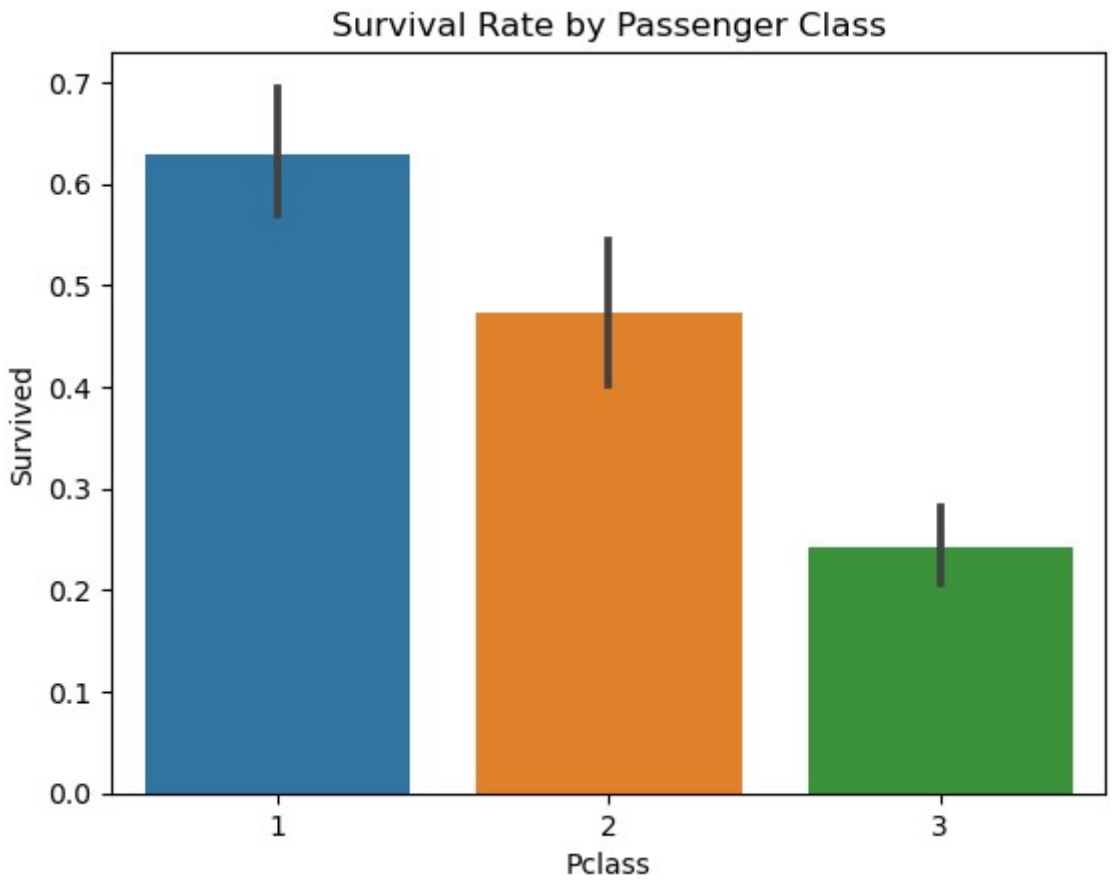


Bivariate Analysis

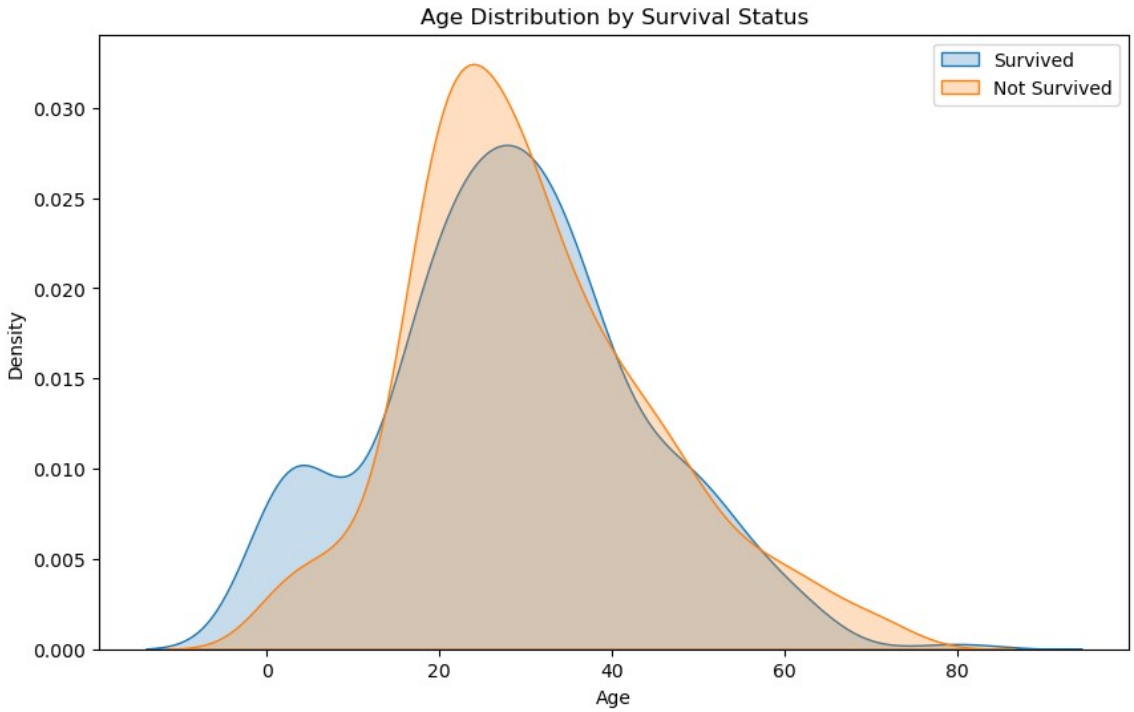
In [32]:
```
# Survival rate by 'Sex' in training dataset
sns.barplot(x='Sex', y='Survived', data=train)
plt.title('Survival Rate by Gender')
plt.show()
```



In [33]:
```
# Survival rate by 'Pclass' in training dataset
sns.barplot(x='Pclass', y='Survived', data=train)
plt.title('Survival Rate by Passenger Class')
plt.show()
```

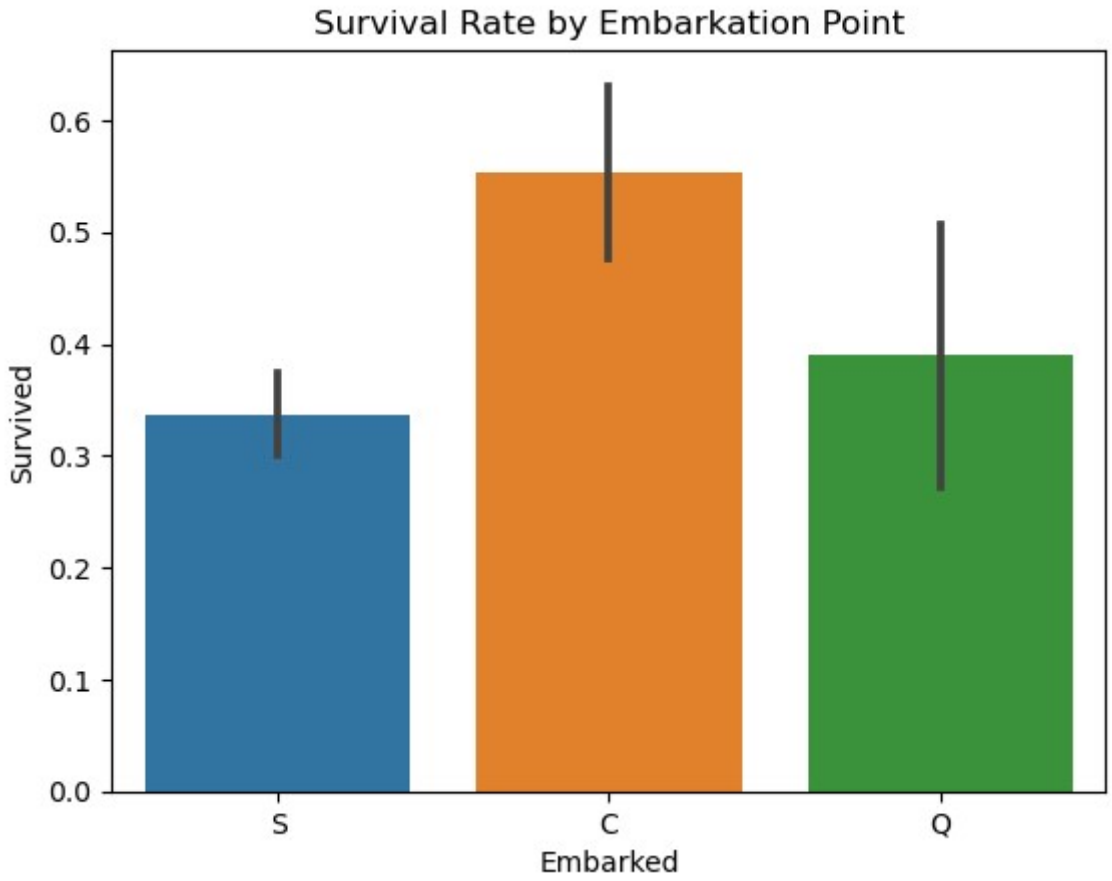


In [34]:
```
# Age distribution by 'Survived' in training dataset
plt.figure(figsize=(10, 6))
sns.kdeplot(data=train[train['Survived'] == 1]['Age'].dropna(), label='Surv
sns.kdeplot(data=train[train['Survived'] == 0]['Age'].dropna(), label='Not
plt.title('Age Distribution by Survival Status')
plt.legend()
plt.show()
```



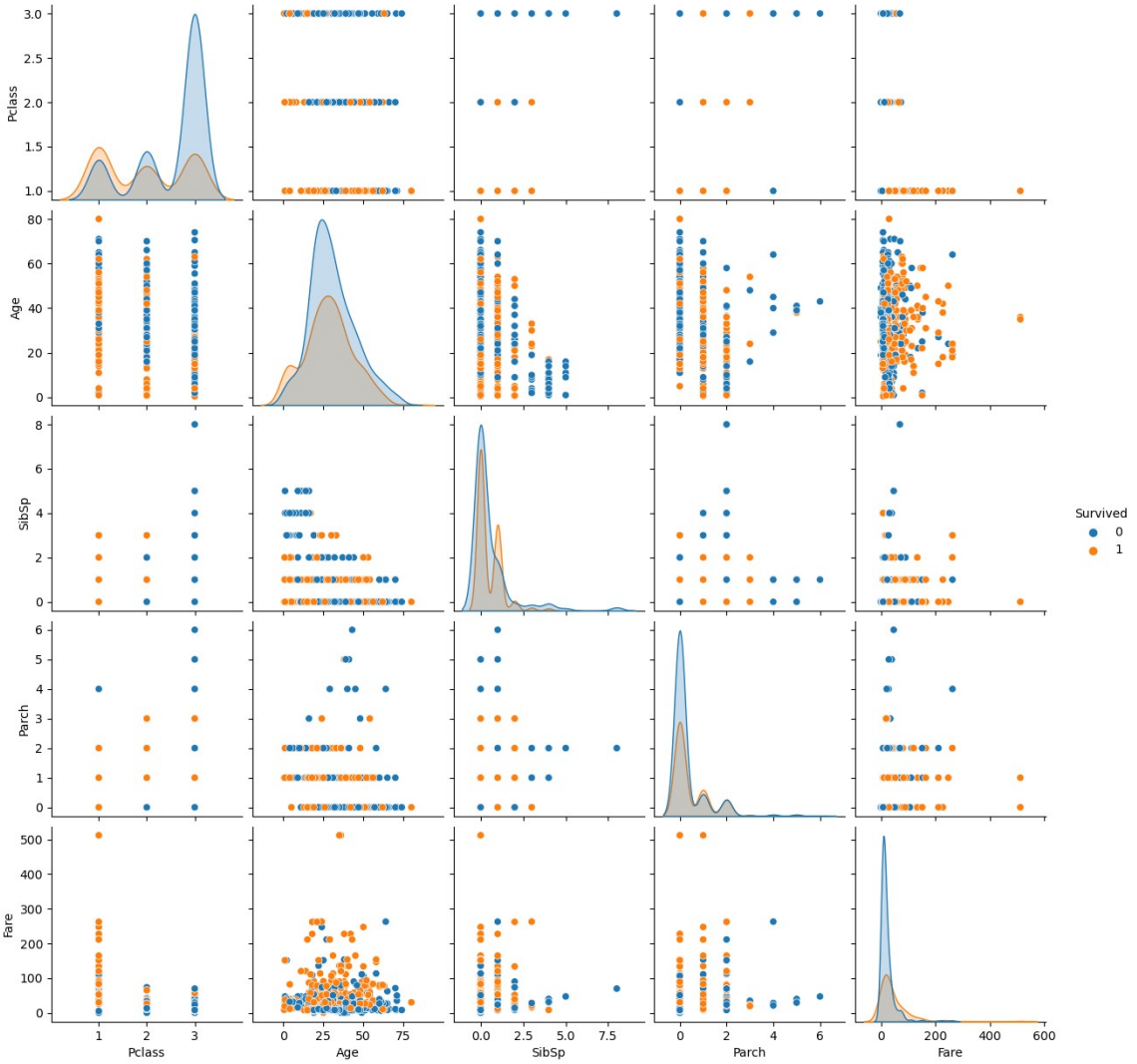
Categorical Analysis

In [37]:
```
# Survival rate by 'Embarked' in training dataset
sns.barplot(x='Embarked', y='Survived', data=train)
plt.title('Survival Rate by Embarkation Point')
plt.show()
```

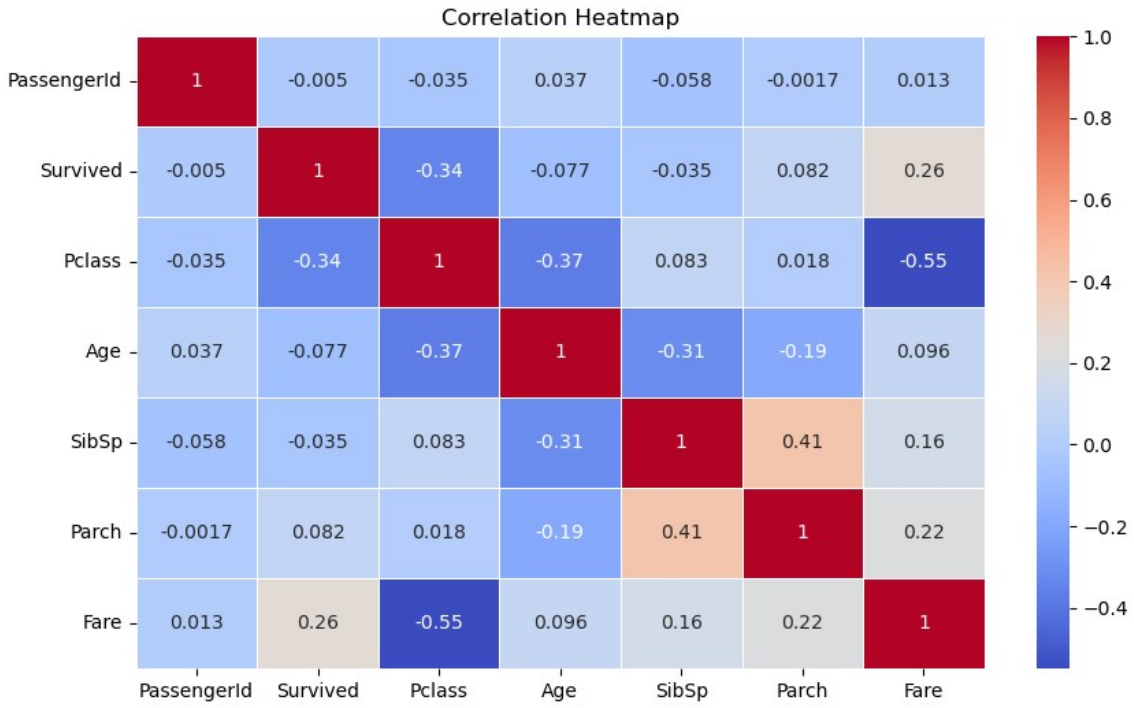


Multivariate Analysis

In [38]:
```
# Pairplot to visualize relationships between features in training dataset
sns.pairplot(train[['Survived', 'Pclass', 'Age', 'SibSp', 'Parch', 'Fare']]
plt.show()
```

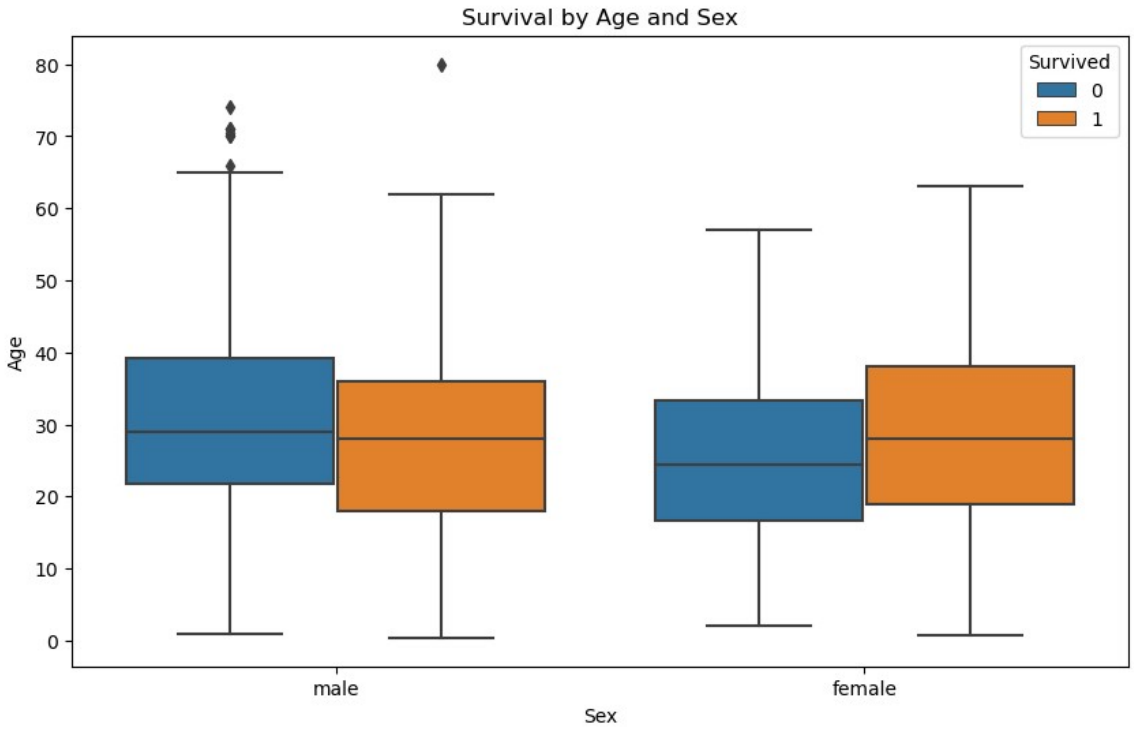


In [39]:
```
# Correlation heatmap of training dataset
plt.figure(figsize=(10, 6))
sns.heatmap(train.corr(), annot=True, cmap='coolwarm', linewidths=0.5)
plt.title('Correlation Heatmap')
plt.show()
```

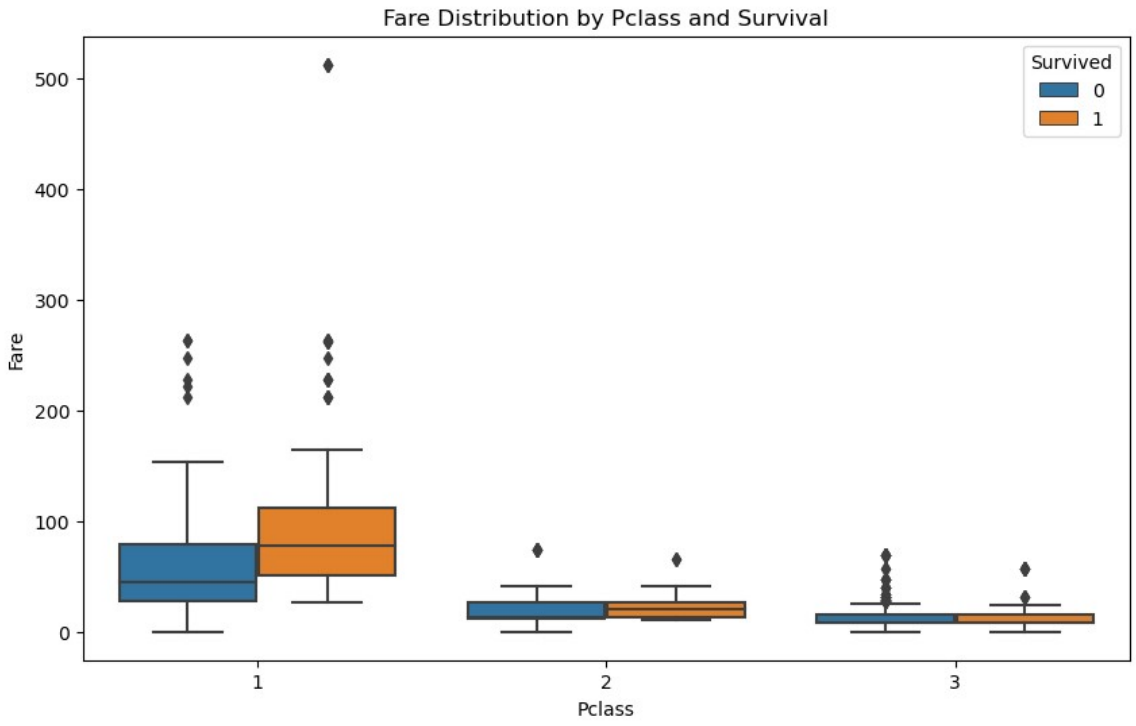


Additional Analysis

In [40]:
```
# Check survival rate by 'Age' and 'Sex'
plt.figure(figsize=(10, 6))
sns.boxplot(x='Sex', y='Age', hue='Survived', data=train)
plt.title('Survival by Age and Sex')
plt.show()
```



In [41]:
```
# Check fare distribution by 'Pclass' and 'Survived'
plt.figure(figsize=(10, 6))
sns.boxplot(x='Pclass', y='Fare', hue='Survived', data=train)
plt.title('Fare Distribution by Pclass and Survival')
plt.show()
```



In [ ]: