In [1]:

```
# Titanic EDA - Internship Task

# =========================
# 1. Import Libraries
# =========================
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns

# Display all columns in output
pd.set_option('display.max_columns', None)

# =========================
# 2. Load Dataset
# =========================
df = pd.read_csv("train.csv")
print("✅ Dataset loaded successfully")
df.head()

# =========================
# 3. Basic Info
# =========================
print("\n📌 Shape of dataset:", df.shape)
print("\n📌 Data Types:")
print(df.dtypes)
print("\n📌 Missing Values:")
print(df.isnull().sum())

# =========================
# 4. Statistical Summary
# =========================
print("\n📌 Statistical Summary:")
print(df.describe())

# =========================
# 5. Value Counts for Categorical Columns
# =========================
print("\n📌 Gender counts:\n", df['Sex'].value_counts())
print("\n📌 Embarked counts:\n", df['Embarked'].value_counts())

# =========================
# 6. Data Cleaning
# =========================
df['Age'].fillna(df['Age'].median(), inplace=True)
df['Embarked'].fillna(df['Embarked'].mode()[0], inplace=True)
df.drop(columns=['Cabin'], inplace=True)

print("\n📌 Missing Values after cleaning:")
print(df.isnull().sum())

# =========================
# 7. Univariate Analysis
# =========================
plt.figure(figsize=(6,4))
sns.histplot(df['Age'], kde=True)
plt.title("Age Distribution")
plt.show()
```

```
plt.figure(figsize=(6,4))
sns.boxplot(x=df['Fare'])
plt.title("Fare Distribution with Outliers")
plt.show()

# ========================
# 8. Bivariate Analysis
# ========================
plt.figure(figsize=(6,4))
sns.barplot(x='Sex', y='Survived', data=df)
plt.title("Survival Rate by Gender")
plt.show()

plt.figure(figsize=(6,4))
sns.barplot(x='Pclass', y='Survived', data=df)
plt.title("Survival Rate by Passenger Class")
plt.show()

# ========================
# 9. Correlation Heatmap
# ========================
plt.figure(figsize=(8,6))
sns.heatmap(df.corr(), annot=True, cmap="coolwarm")
plt.title("Correlation Heatmap")
plt.show()

# ========================
# 10. Pairplot
# ========================
sns.pairplot(df[['Survived','Age','Fare','Pclass']], hue='Survived')
plt.show()

# ========================
# 11. Summary of Findings
# ========================
summary = """
📊 Key Insights:
1. Females had a much higher survival rate than males.
2. Passengers in 1st class had the highest survival rate, 3rd class the lowest.
3. Most passengers were aged 20–40 years.
4. Fare distribution shows extreme outliers — some passengers paid very high far
5. Class and gender are the strongest survival indicators; age and fare have wea
"""
print(summary)
```

✅ Dataset loaded successfully

📌 Shape of dataset: (891, 12)

📌 Data Types:

```
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
```

📌 Missing Values:

```
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
```

📌 Statistical Summary:

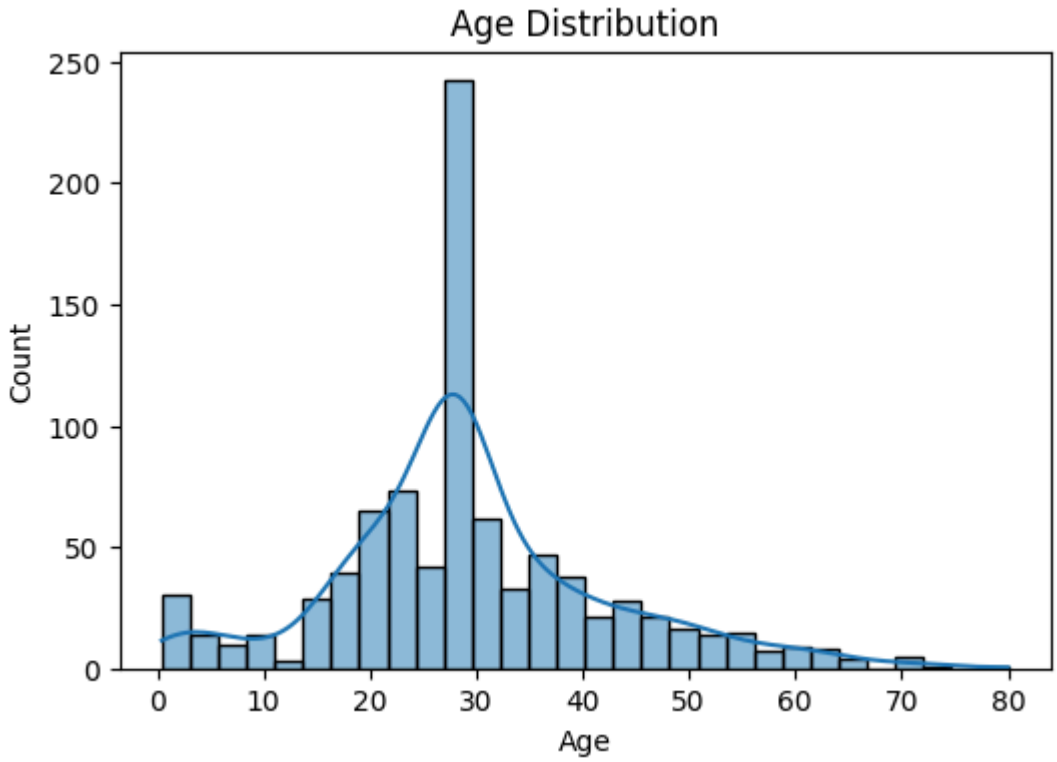
```
       PassengerId    Survived      Pclass         Age       SibSp  \
count   891.000000  891.000000  891.000000  714.000000  891.000000
mean    446.000000    0.383838    2.308642   29.699118    0.523008
std     257.353842    0.486592    0.836071   14.526497    1.102743
min       1.000000    0.000000    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
```

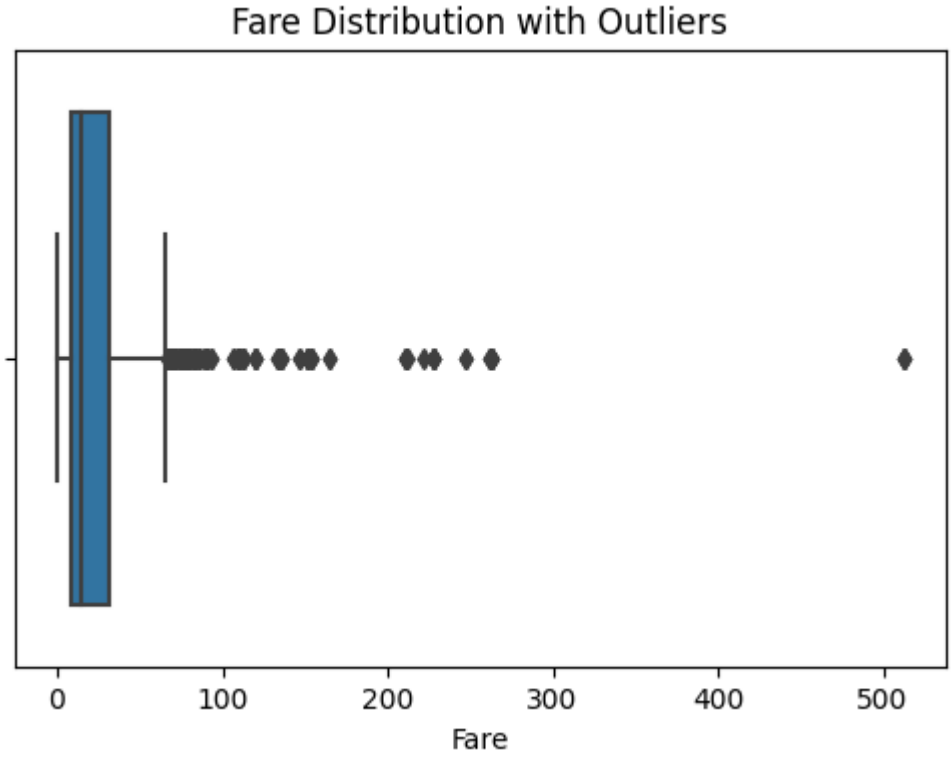
📌 Gender counts:

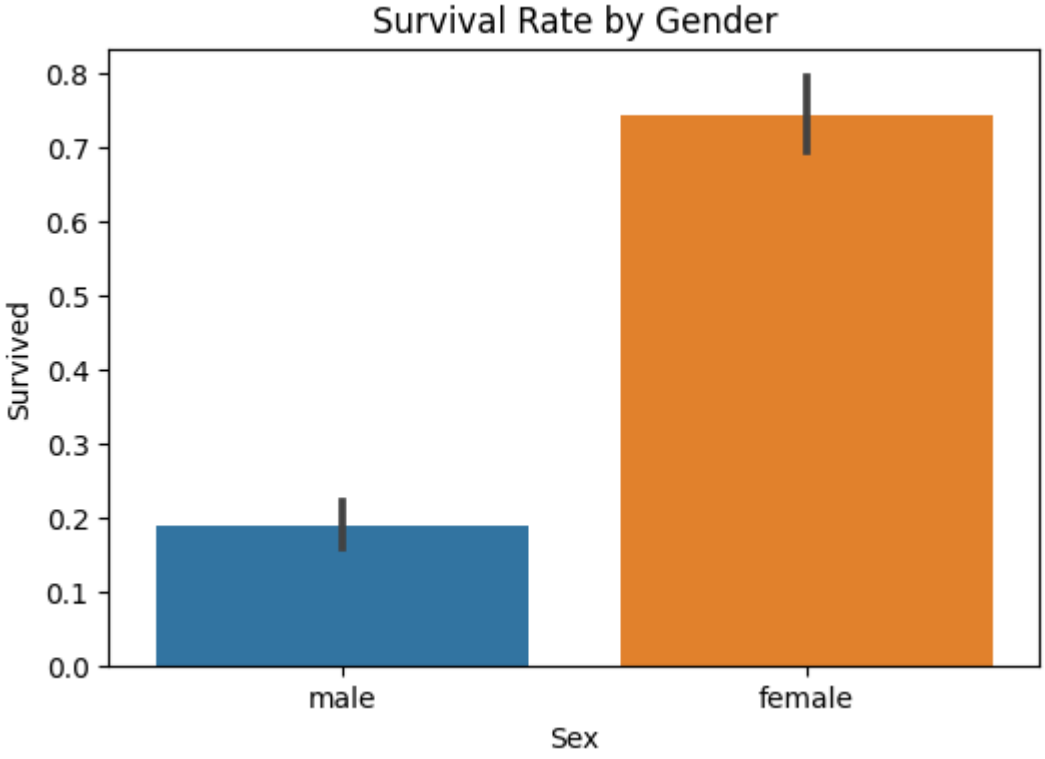
```
 male      577
female    314
Name: Sex, dtype: int64
```

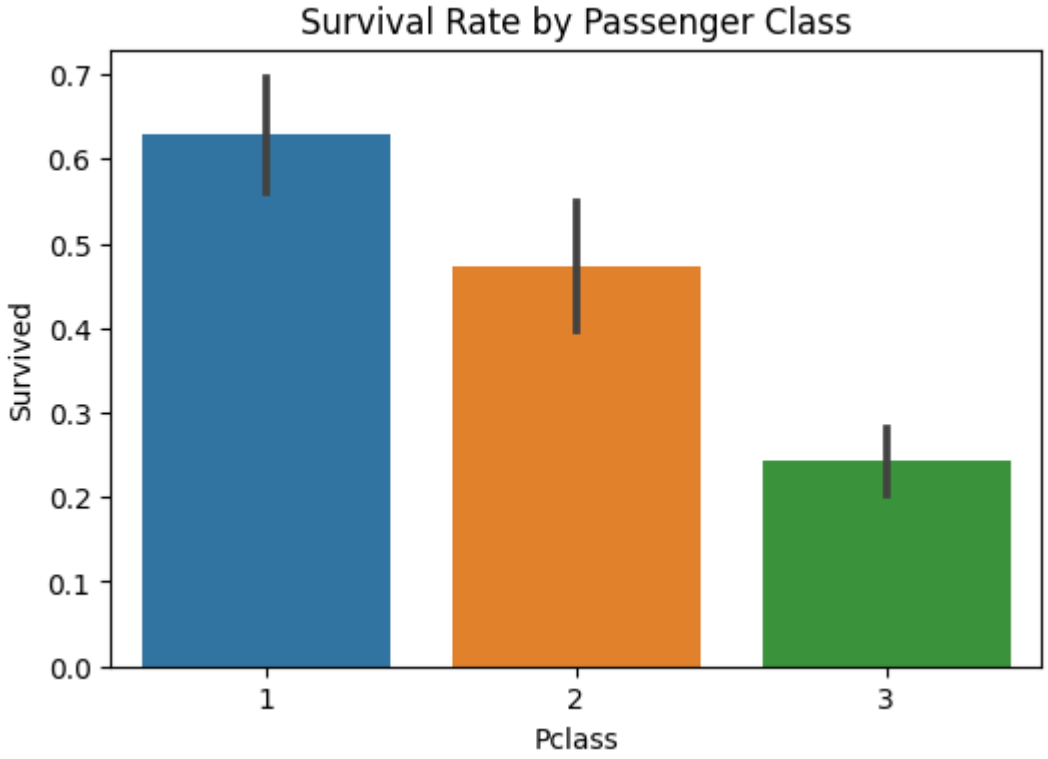
📌 Embarked counts:
```
 S    644
C    168
Q     77
Name: Embarked, dtype: int64
```

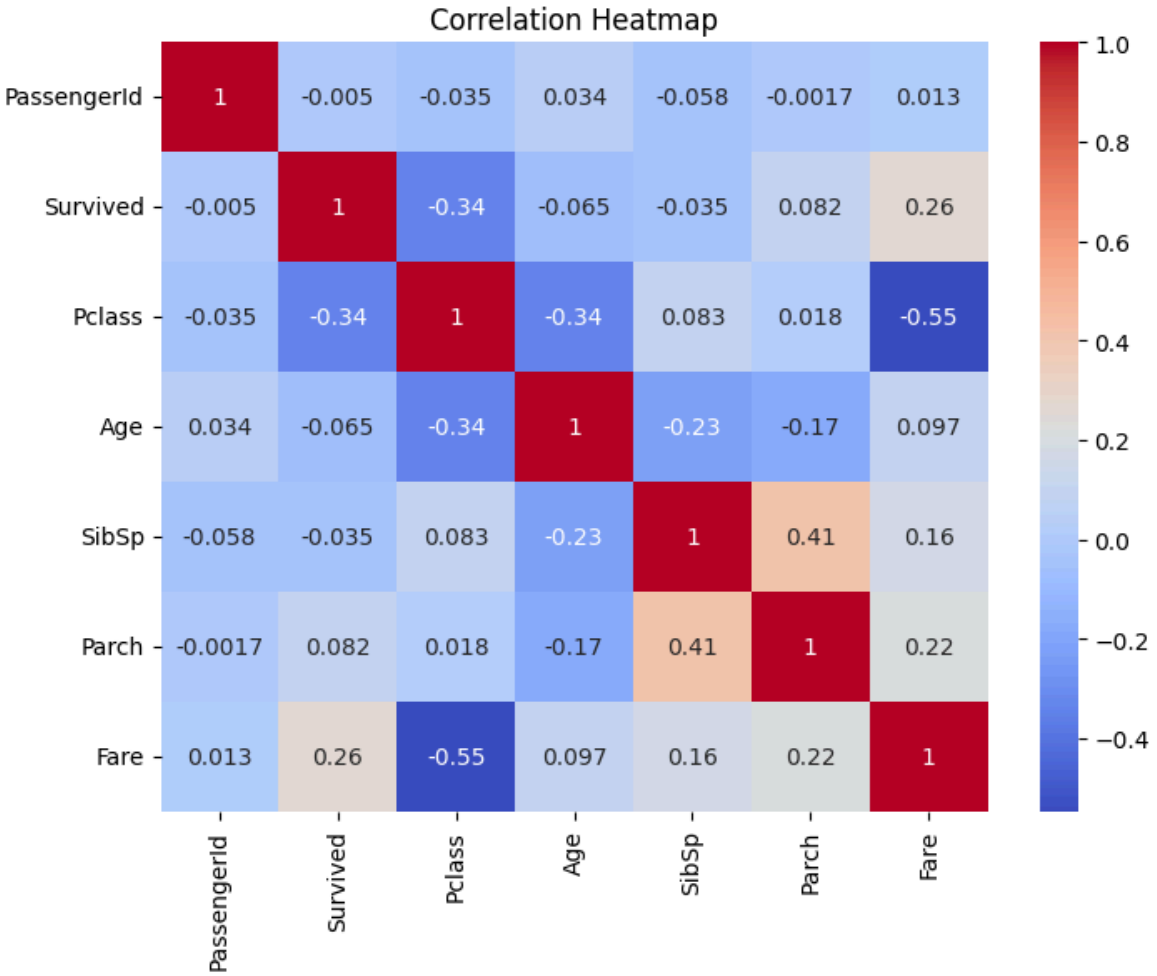
📌 Missing Values after cleaning:
```
PassengerId    0
Survived       0
Pclass         0
Name           0
Sex            0
Age            0
SibSp          0
Parch          0
Ticket         0
Fare           0
Embarked       0
dtype: int64
```

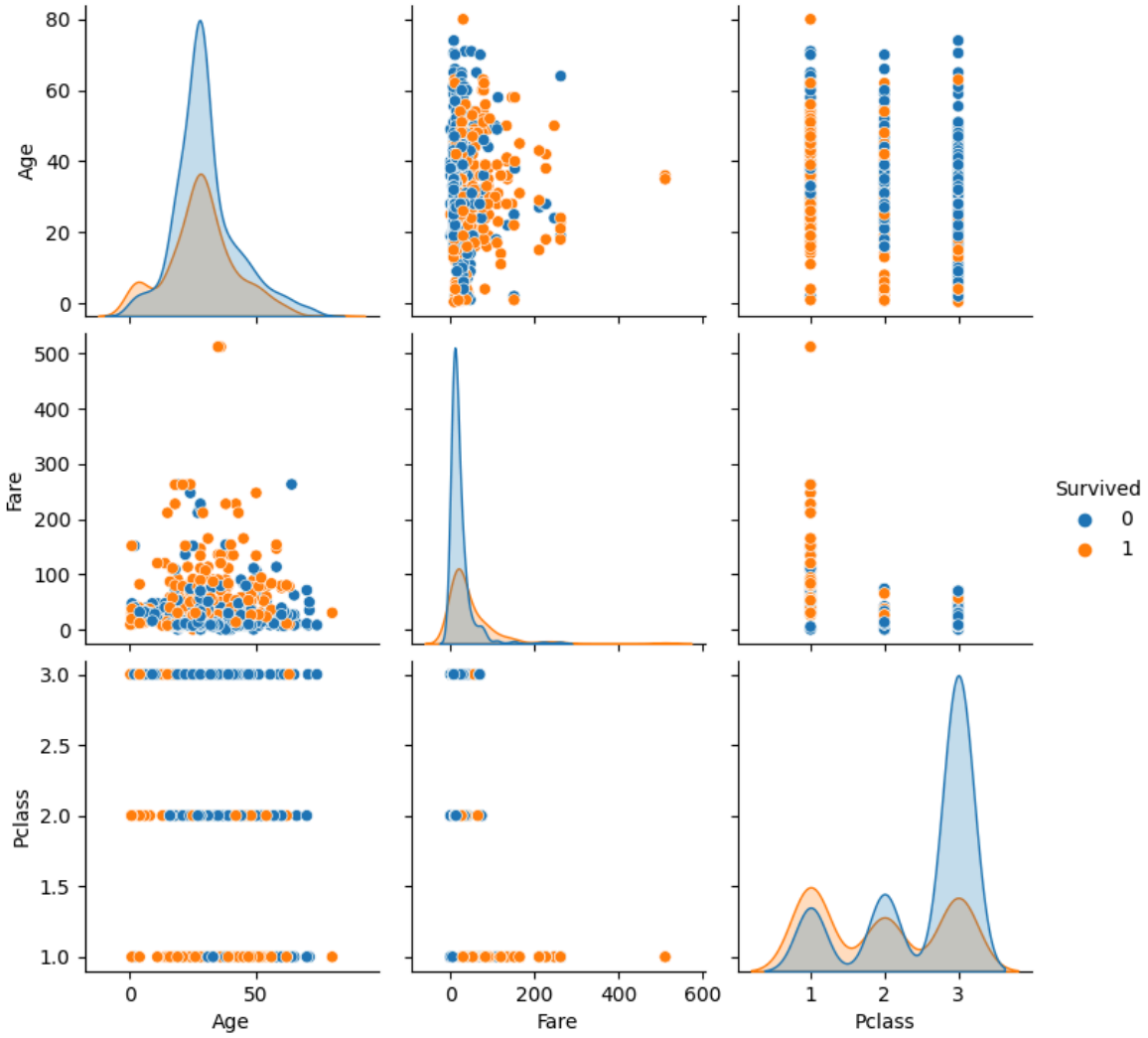



Fare Distribution with Outliers
0
100
200
300
400
500
Fare


Survival Rate by Gender
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Survived
male
female
Sex


Survival Rate by Passenger Class
Survived
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
1
2
3
Pclass


Correlation Heatmap
PassengerId
Survived
Pclass
Age
SibSp
Parch
Fare
1 -0.005 -0.035 0.034 -0.058 -0.0017 0.013
-0.005 1 -0.34 -0.065 -0.035 0.082 0.26
-0.035 -0.34 1 -0.34 0.083 0.018 -0.55
0.034 -0.065 -0.34 1 -0.23 -0.17 0.097
-0.058 -0.035 0.083 -0.23 1 0.41 0.16
-0.0017 0.082 0.018 -0.17 0.41 1 0.22
0.013 0.26 -0.55 0.097 0.16 0.22 1
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4



📊 Key Insights:

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2. Passengers in 1st class had the highest survival rate, 3rd class the lowest.
3. Most passengers were aged 20–40 years.
4. Fare distribution shows extreme outliers — some passengers paid very high fares.
5. Class and gender are the strongest survival indicators; age and fare have weaker influence.

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