```python
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

train = pd.read_csv(r"C:\Users\Tushar Sable\Desktop\Day5\train.csv")
test = pd.read_csv(r"C:\Users\Tushar Sable\Desktop\Day5\test.csv")
gender = pd.read_csv(r"C:\Users\Tushar Sable\Desktop\Day5\
gender_submission.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
```

```python
train.info()
train.describe(include='all').T
```

```
<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
```

```
             count unique                      top freq       mean  \
PassengerId  891.0    NaN                      NaN  NaN      446.0   
Survived     891.0    NaN                      NaN  NaN   0.383838   
Pclass       891.0    NaN                      NaN  NaN   2.308642   
Name           891    891  Braund, Mr. Owen Harris    1        NaN   
Sex            891      2                     male  577        NaN   
Age          714.0    NaN                      NaN  NaN  29.699118   
SibSp        891.0    NaN                      NaN  NaN   0.523008   
Parch        891.0    NaN                      NaN  NaN   0.381594   
Ticket         891    681                   347082    7        NaN   
Fare         891.0    NaN                      NaN  NaN  32.204208   
Cabin          204    147                  B96 B98    4        NaN   
Embarked       889      3                        S  644        NaN   

                   std   min     25%      50%    75%       max  
PassengerId  257.353842   1.0   223.5    446.0  668.5     891.0  
Survived       0.486592   0.0     0.0      0.0    1.0       1.0  
Pclass         0.836071   1.0     2.0      3.0    3.0       3.0  
Name                NaN   NaN     NaN      NaN    NaN       NaN  
Sex                 NaN   NaN     NaN      NaN    NaN       NaN  
Age           14.526497  0.42  20.125     28.0   38.0      80.0  
SibSp          1.102743   0.0     0.0      0.0    1.0       8.0  
Parch          0.806057   0.0     0.0      0.0    0.0       6.0  
Ticket              NaN   NaN     NaN      NaN    NaN       NaN  
Fare          49.693429   0.0  7.9104  14.4542   31.0  512.3292  
Cabin               NaN   NaN     NaN      NaN    NaN       NaN  
Embarked            NaN   NaN     NaN      NaN    NaN       NaN  
```

```
missing_counts = train.isnull().sum()
missing_pct = (train.isnull().mean() * 100).round(2)
pd.concat([missing_counts, missing_pct], axis=1,
keys=['missing_count', 'missing_pct'])
```

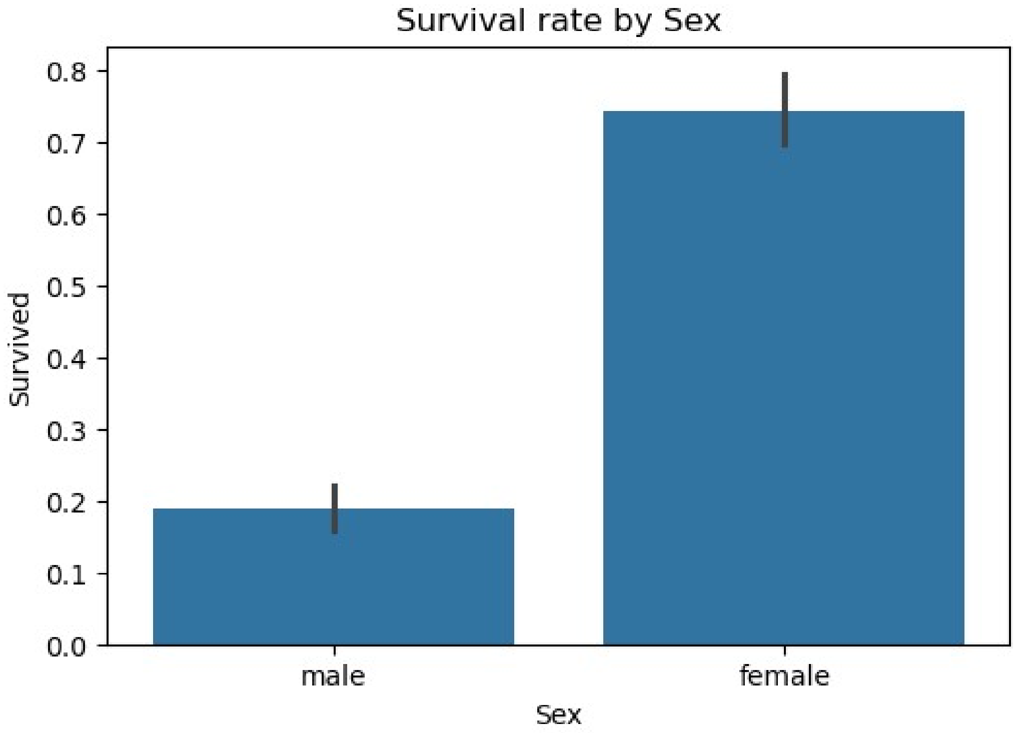
```
             missing_count  missing_pct
PassengerId              0         0.00
Survived                 0         0.00
Pclass                   0         0.00
Name                     0         0.00
Sex                      0         0.00
```

```
Age                    177        19.87
SibSp                    0         0.00
Parch                    0         0.00
Ticket                   0         0.00
Fare                     0         0.00
Cabin                  687        77.10
Embarked                 2         0.22
```

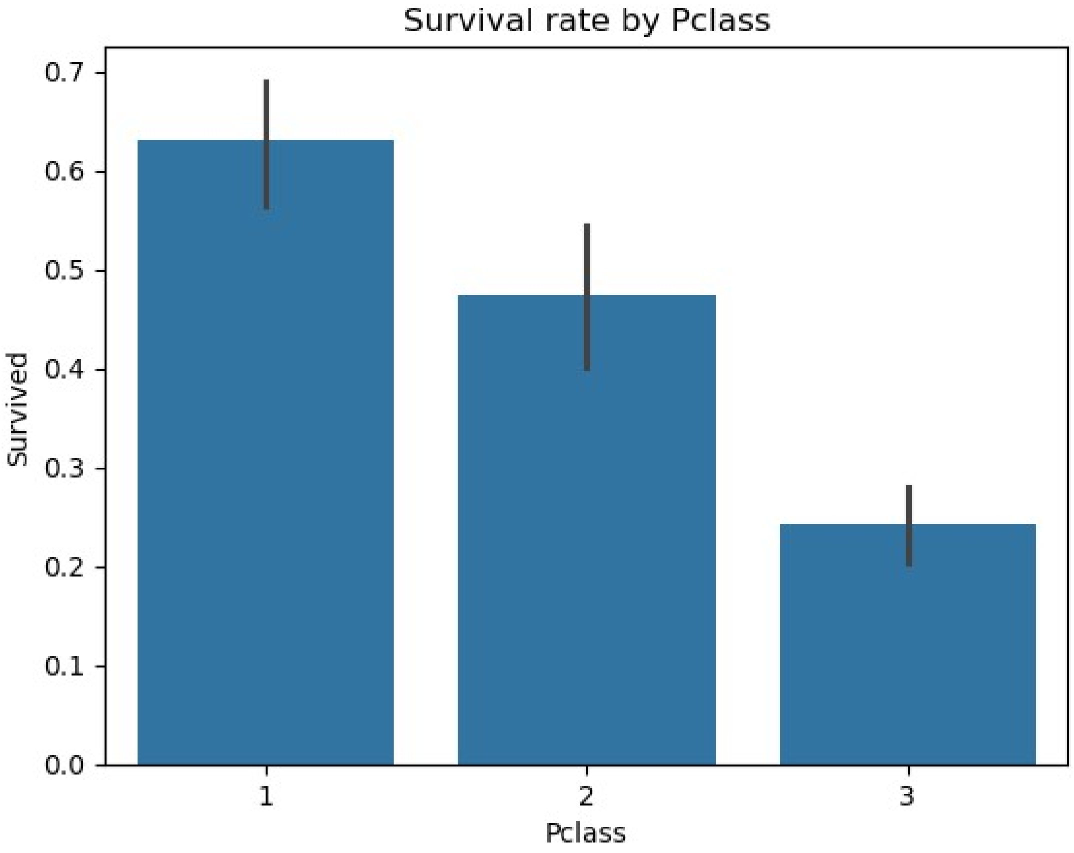
```
print("Survived:\n", train['Survived'].value_counts(normalize=False))
print("\nSex:\n", train['Sex'].value_counts())
print("\nPclass:\n", train['Pclass'].value_counts())
print("\nEmbarked (incl NaNs):\n",
train['Embarked'].value_counts(dropna=False))
```

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

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

Pclass:
 Pclass
3    491
1    216
2    184
Name: count, dtype: int64

Embarked (incl NaNs):
 Embarked
S      644
C      168
Q       77
NaN      2
Name: count, dtype: int64
```

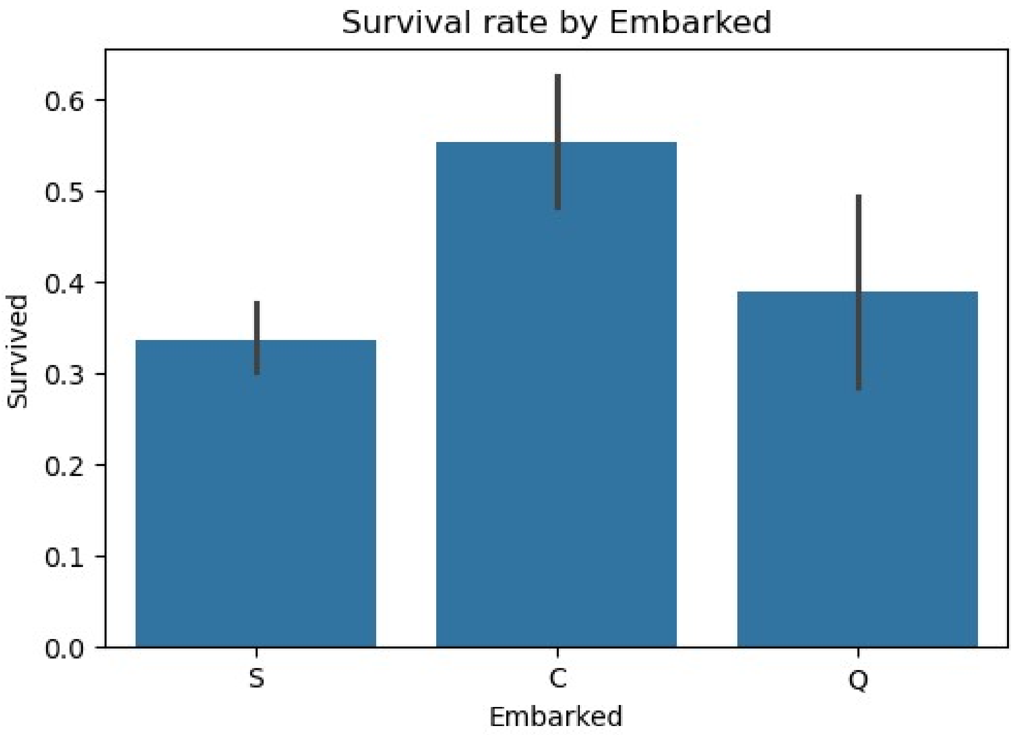
```
plt.figure(figsize=(6,4))
sns.barplot(x='Sex', y='Survived', data=train)
plt.title('Survival rate by Sex')
plt.show()
```



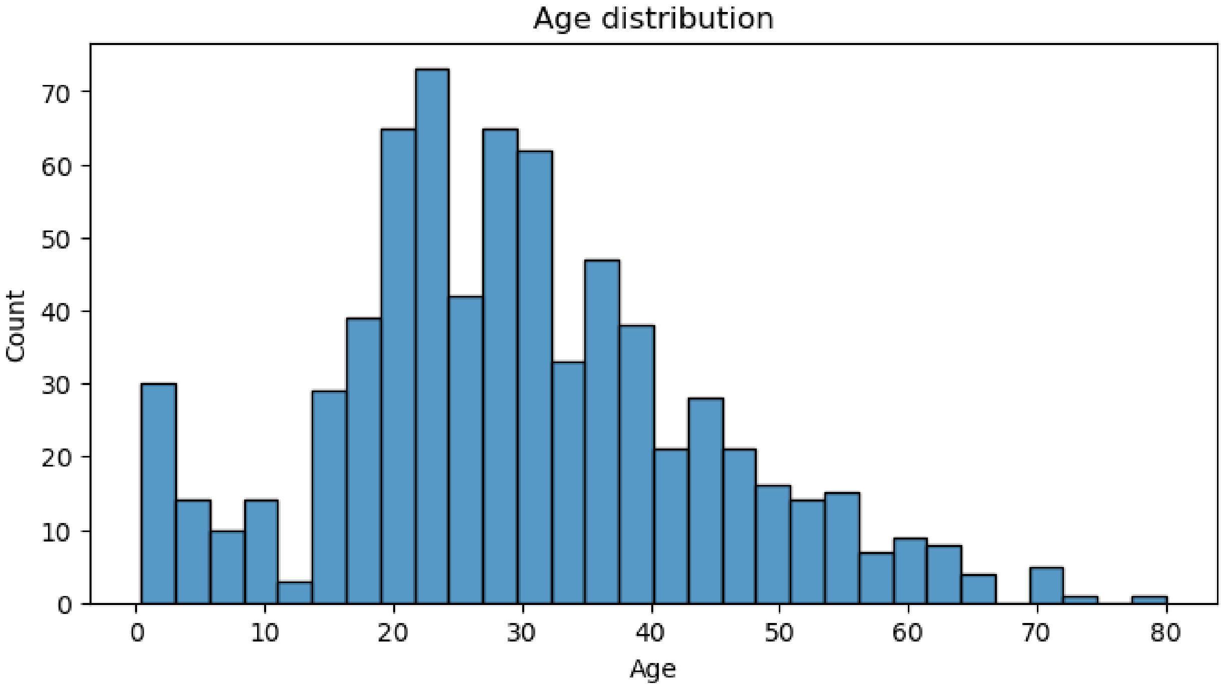
```
sns.barplot(x='Pclass', y='Survived', data=train)
plt.title('Survival rate by Pclass')
plt.show()
```



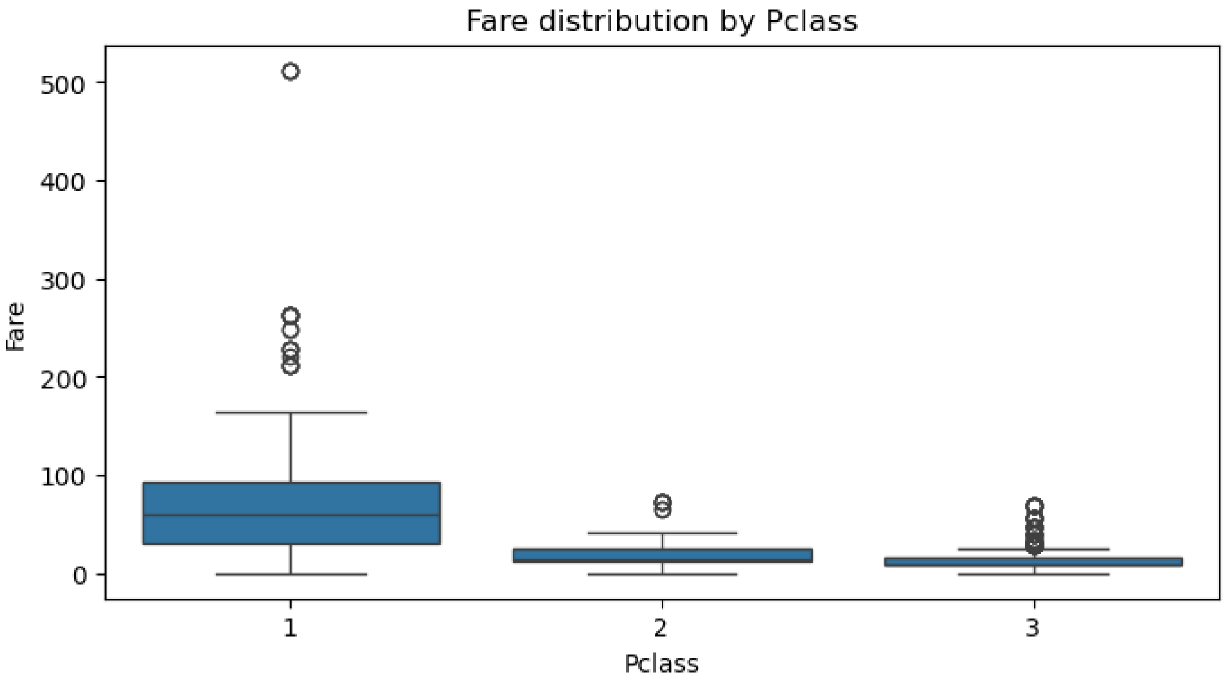
```
plt.figure(figsize=(6,4))
sns.barplot(x='Embarked', y='Survived', data=train)
plt.title('Survival rate by Embarked')
plt.show()
```



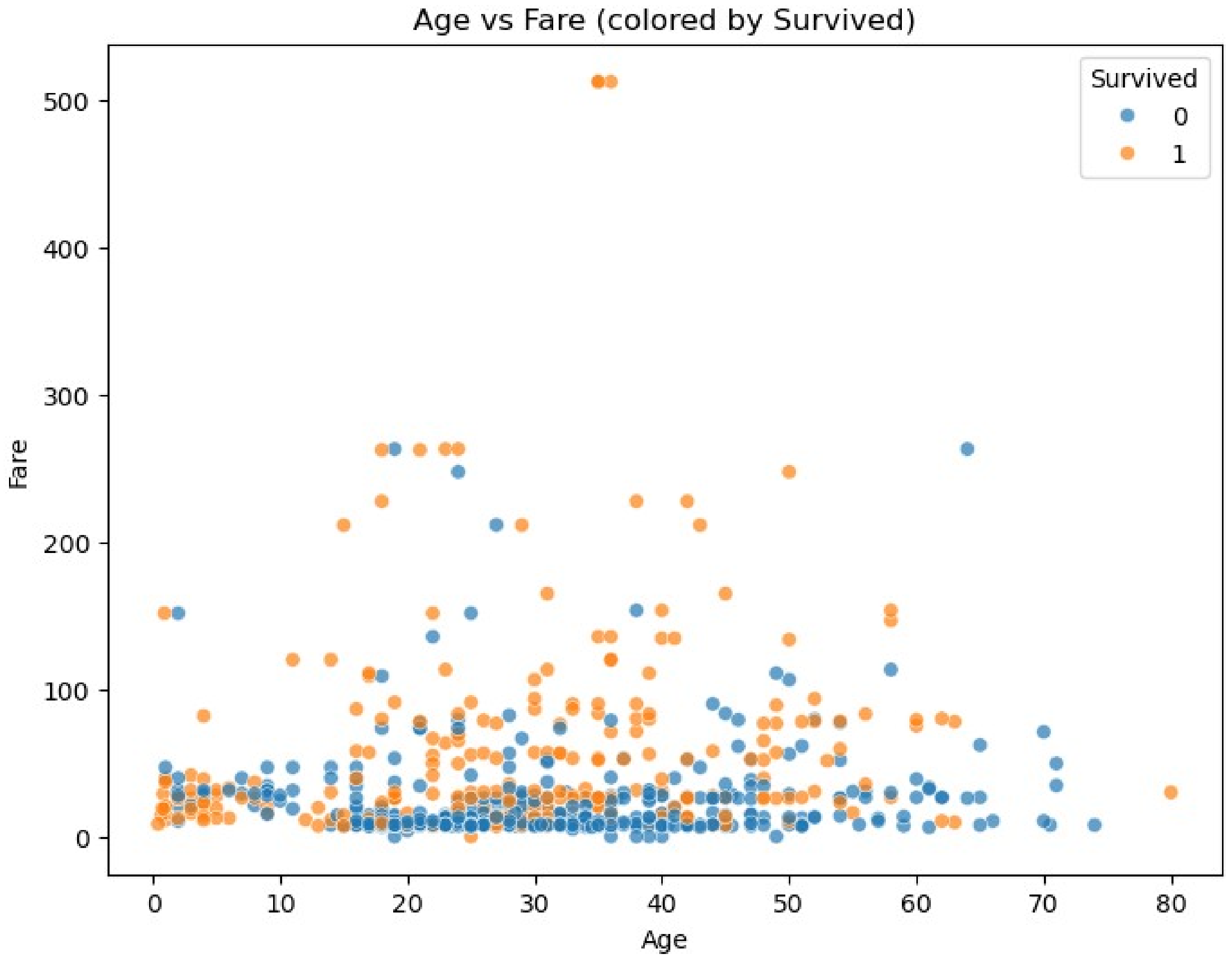
```
plt.figure(figsize=(8,4))
sns.histplot(train['Age'].dropna(), bins=30)
plt.title('Age distribution')
plt.xlabel('Age')
plt.show()
```



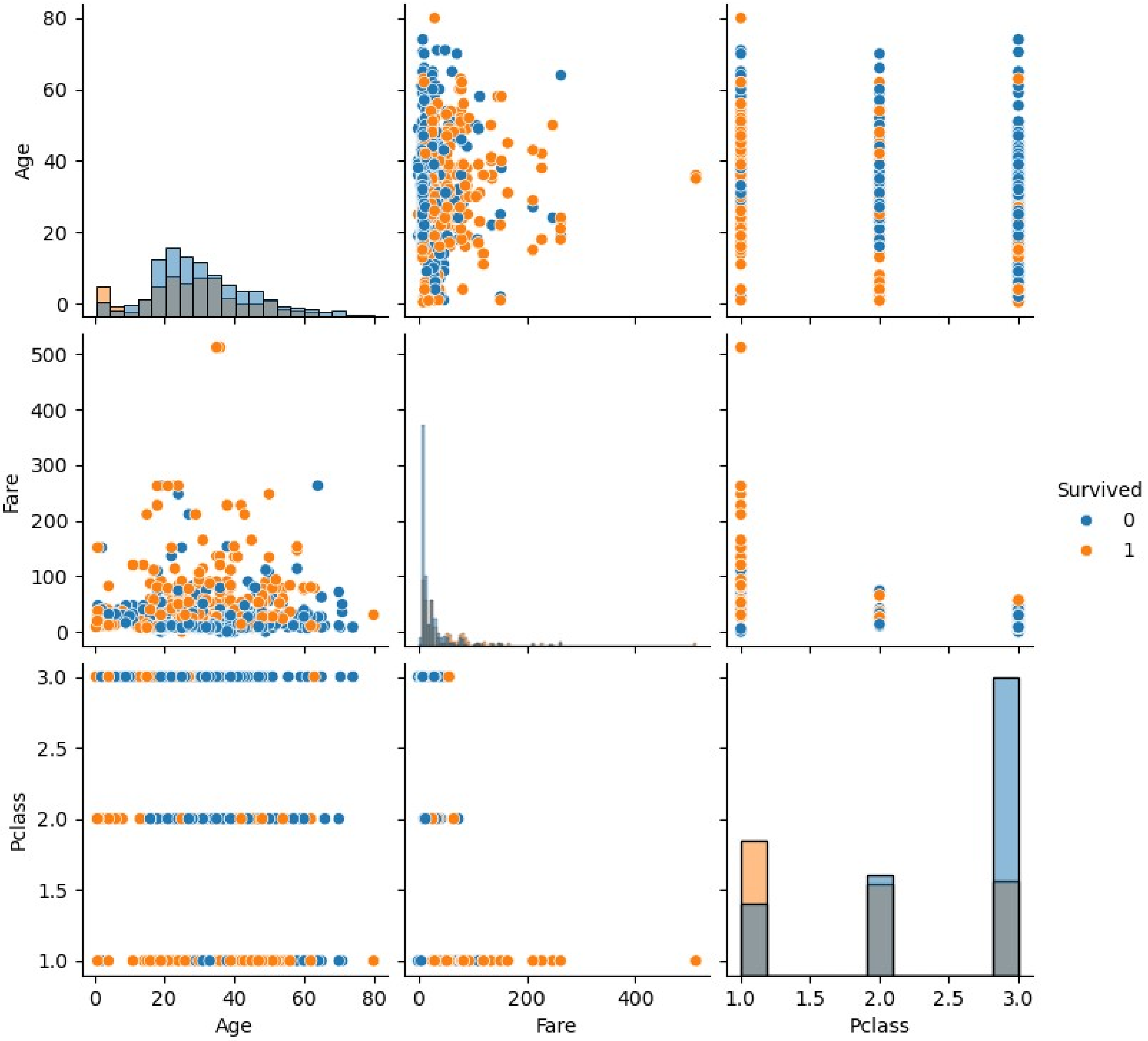
```
plt.figure(figsize=(8,4))
sns.boxplot(x='Pclass', y='Fare', data=train)
plt.title('Fare distribution by Pclass')
plt.show()
```



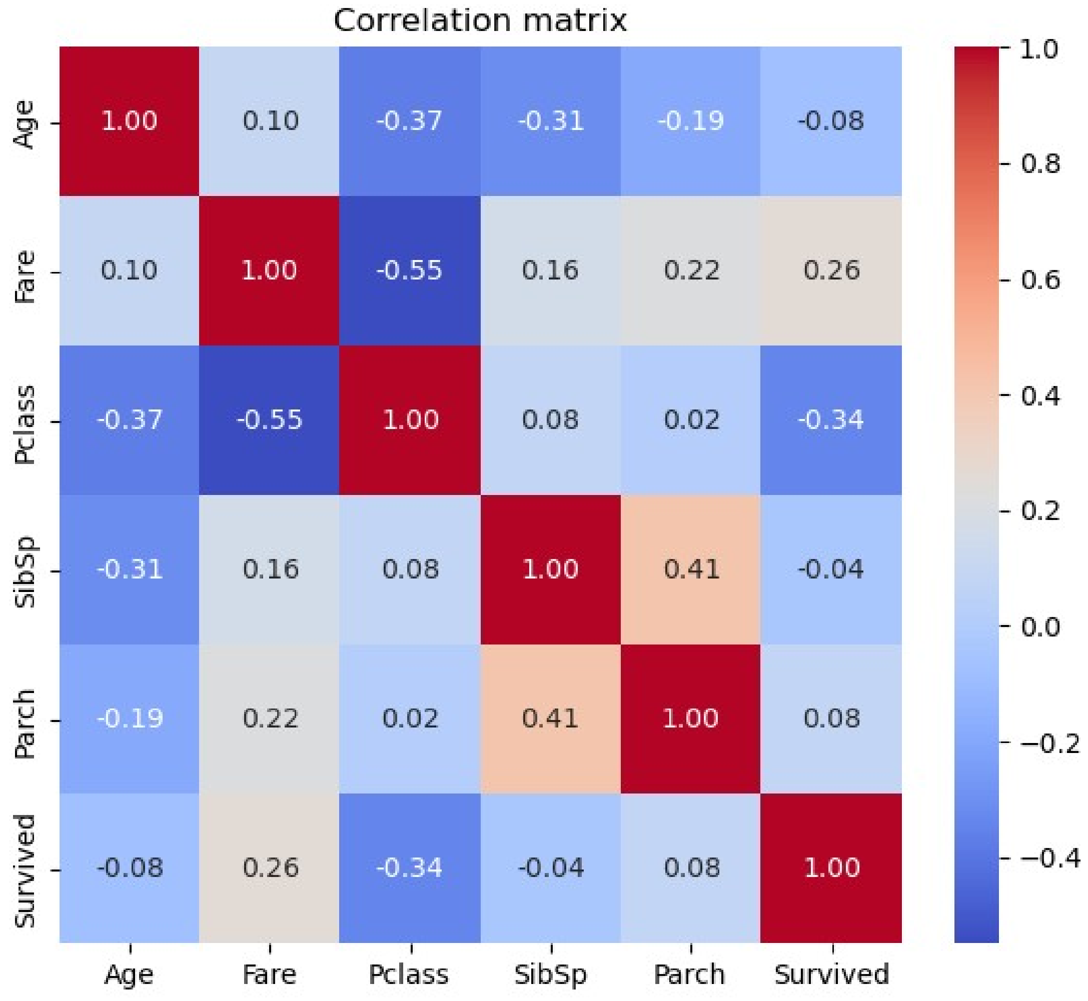
```
plt.figure(figsize=(8,6))
sns.scatterplot(x='Age', y='Fare', hue='Survived', data=train,
alpha=0.7)
plt.title('Age vs Fare (colored by Survived)')
plt.show()
```



```
cols = ['Age','Fare','Pclass','SibSp','Parch','Survived']
sns.pairplot(train[cols].dropna(), hue='Survived', diag_kind='hist',
vars=['Age','Fare','Pclass'])
plt.show()
```



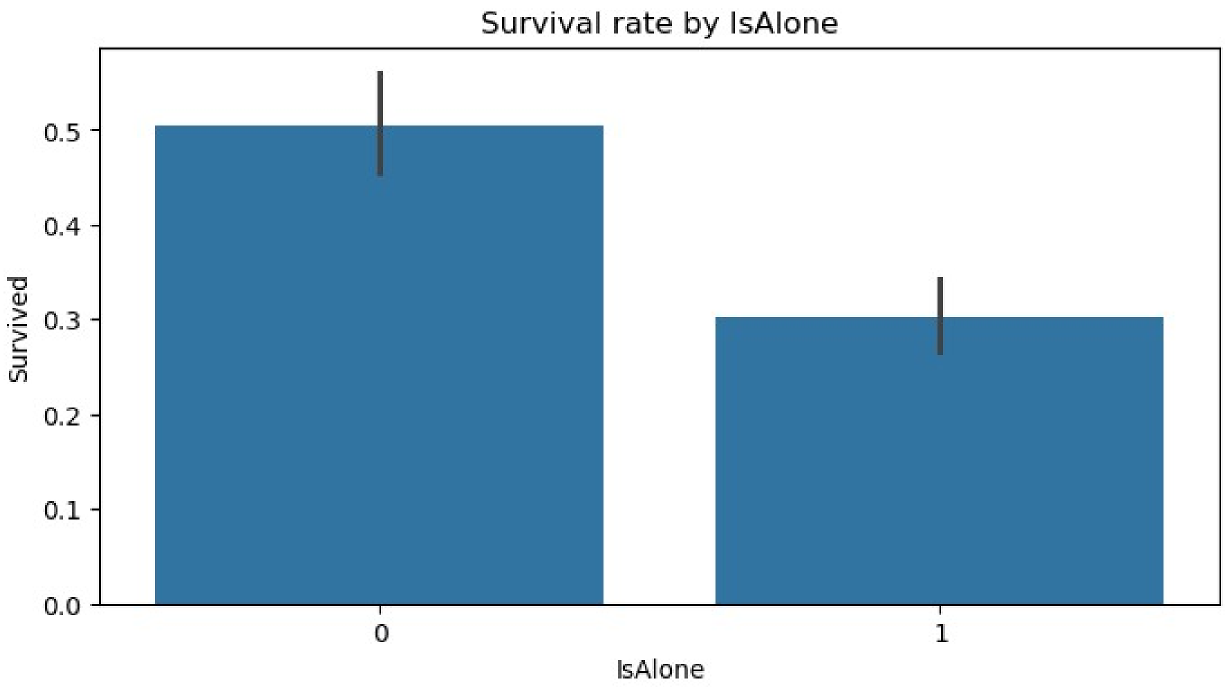
```
corr = train[cols].corr()
plt.figure(figsize=(7,6))
sns.heatmap(corr, annot=True, fmt=".2f", cmap='coolwarm')
plt.title('Correlation matrix')
plt.show()
```



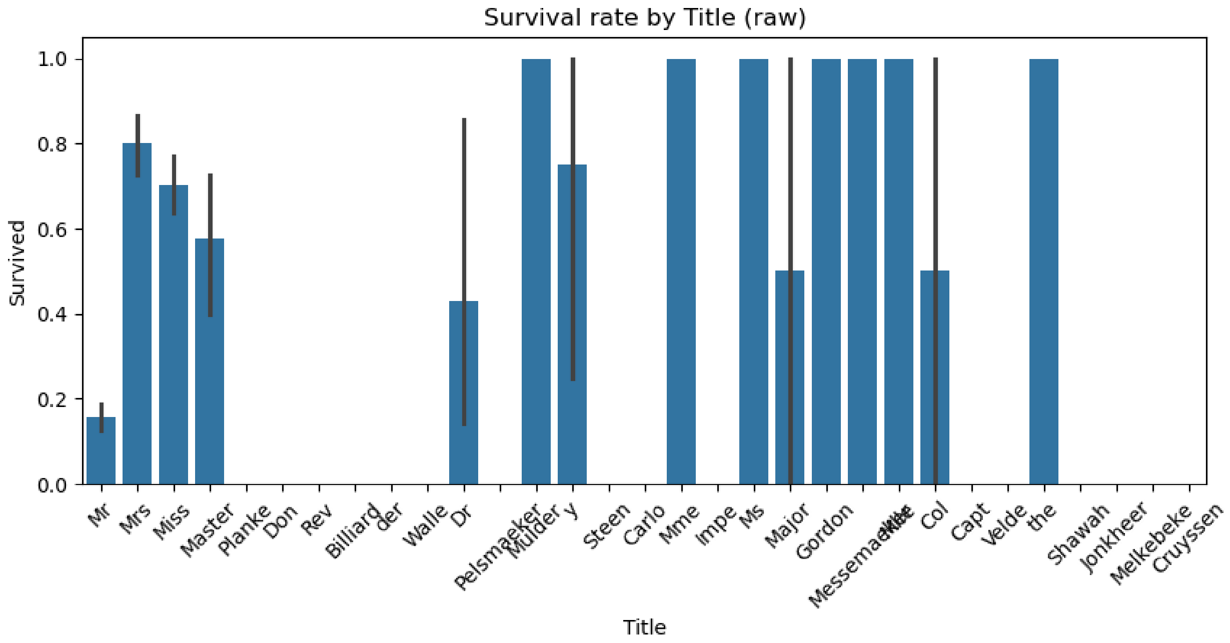
```
train['Title'] = train['Name'].str.extract(' ([A-Za-z]+).',
expand=False)
train['FamilySize'] = train['SibSp'] + train['Parch'] + 1
train['IsAlone'] = (train['FamilySize'] == 1).astype(int)
train['HasCabin'] = train['Cabin'].notnull().astype(int)

train[['Title','FamilySize','IsAlone','HasCabin']].head()
```

```
  Title  FamilySize  IsAlone  HasCabin
0    Mr           2        0         0
1   Mrs           2        0         1
2  Miss           1        1         0
3   Mrs           2        0         1
4    Mr           1        1         0
```

```
plt.figure(figsize=(8,4))
sns.barplot(x='IsAlone', y='Survived', data=train)
plt.title('Survival rate by IsAlone')
plt.show()
```



```python
plt.figure(figsize=(10,4))
sns.barplot(x='Title', y='Survived', data=train)
plt.title('Survival rate by Title (raw)')
plt.xticks(rotation=45)
plt.show()
```



```
train['Age_filled'] = train['Age'].fillna(train['Age'].median())
train['Embarked_filled'] =
train['Embarked'].fillna(train['Embarked'].mode()[0])

train[['Age','Age_filled','Embarked','Embarked_filled']].head()
```

```
    Age  Age_filled Embarked Embarked_filled
0  22.0        22.0        S               S
1  38.0        38.0        C               C
2  26.0        26.0        S               S
3  35.0        35.0        S               S
4  35.0        35.0        S               S
```

```
train.groupby('Sex')['Survived'].mean()
```

```
Sex
female    0.742038
male      0.188908
Name: Survived, dtype: float64
```

```
train[['Survived','Pclass','Age','Fare','SibSp','Parch']].corr()
['Survived'].sort_values(ascending=False)
```

```
Survived    1.000000
Fare        0.257307
Parch       0.081629
SibSp      -0.035322
Age        -0.077221
Pclass     -0.338481
Name: Survived, dtype: float64
```

```
train.groupby('Pclass')['Survived'].mean()
```

```
Pclass
1    0.629630
2    0.472826
3    0.242363
Name: Survived, dtype: float64
```