In [3]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

In [4]:
```
df=pd.read_csv(r"E:\titanic.csv")
```

In [5]:
```
# Step 1: quick view
df.head()
```

Out[5]:

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

In [6]:
```
df.tail()
```

Out[6]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticke
886	887	0	2	Montvila, Rev. Juozas	male	27.0	0	0	21153
887	888	1	1	Graham, Miss. Margaret Edith	female	19.0	0	0	11205
888	889	0	3	Johnston, Miss. Catherine Helen "Carrie"	female	NaN	1	2	W./C 660
889	890	1	1	Behr, Mr. Karl Howell	male	26.0	0	0	11136
890	891	0	3	Dooley, Mr. Patrick	male	32.0	0	0	37037

In [7]:
```
df.describe()
```

Out[7]:

	PassengerId	Survived	Pclass	Age	SibSp	Parch
count	891.000000	891.000000	891.000000	714.000000	891.000000	891.000000
mean	446.000000	0.383838	2.308642	29.699118	0.523008	0.381594
std	257.353842	0.486592	0.836071	14.526497	1.102743	0.806057
min	1.000000	0.000000	1.000000	0.420000	0.000000	0.000000
25%	223.500000	0.000000	2.000000	20.125000	0.000000	0.000000
50%	446.000000	0.000000	3.000000	28.000000	0.000000	0.000000
75%	668.500000	1.000000	3.000000	38.000000	1.000000	0.000000
max	891.000000	1.000000	3.000000	80.000000	8.000000	6.000000

In [8]:
```
df.shape
```

Out[8]:
```
(891, 12)
```

In [9]:
```
df.size
```

Out[9]:
```
10692
```

In [10]:
```
df.columns
```

Out[10]:
```
Index(['PassengerId', 'Survived', 'Pclass', 'Name', 'Sex', 'Age', 'SibSp',
       'Parch', 'Ticket', 'Fare', 'Cabin', 'Embarked'],
      dtype='object')
```

In [11]:
```
df.dtypes
```

Out[11]:
```
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 [50]:
```
df.info
```

Out[50]:
```
<bound method DataFrame.info of      Survived  Pclass     Sex   Age  SibSp  P
arch     Fare Embarked
0           0       3    male  22.0      1      0   7.2500        S
2           1       3  female  26.0      0      0   7.9250        S
3           1       1  female  35.0      1      0  53.1000        S
4           0       3    male  35.0      0      0   8.0500        S
5           0       3    male  28.0      0      0   8.4583        Q
..        ...     ...     ...   ...    ...    ...      ...      ...
886         0       2    male  27.0      0      0  13.0000        S
887         1       1  female  19.0      0      0  30.0000        S
888         0       3  female  28.0      1      2  23.4500        S
889         1       1    male  26.0      0      0  30.0000        C
890         0       3    male  32.0      0      0   7.7500        Q

[718 rows x 8 columns]>
```

In [12]:
```
df.nunique()
```

Out[12]:
```
PassengerId    891
Survived         2
Pclass           3
Name           891
Sex              2
Age             88
SibSp            7
Parch            7
Ticket         681
Fare           248
Cabin          147
Embarked         3
dtype: int64
```

In [13]:
```
df = df.drop(['PassengerId', 'Name', 'Ticket', 'Cabin'], axis=1)
```

In [14]:
```
df.isnull().sum()
```

Out[14]:
```
Survived      0
Pclass        0
Sex           0
Age         177
SibSp         0
Parch         0
Fare          0
Embarked      2
dtype: int64
```

In [52]:
```
#Useful value_counts
cats = ['Survived','Pclass','Sex','Embarked','Ticket','Cabin']
for c in cats:
    if c in df.columns:
        print(f"\n--- {c} value_counts ---")
        print(df[c].value_counts(dropna=False).head(15))
```

```
--- Survived value_counts ---
Survived
0    478
1    240
Name: count, dtype: int64

--- Pclass value_counts ---
Pclass
3    462
2    162
1     94
Name: count, dtype: int64

--- Sex value_counts ---
Sex
male      489
female    229
Name: count, dtype: int64

--- Embarked value_counts ---
Embarked
S    543
C    104
Q     71
Name: count, dtype: int64
```

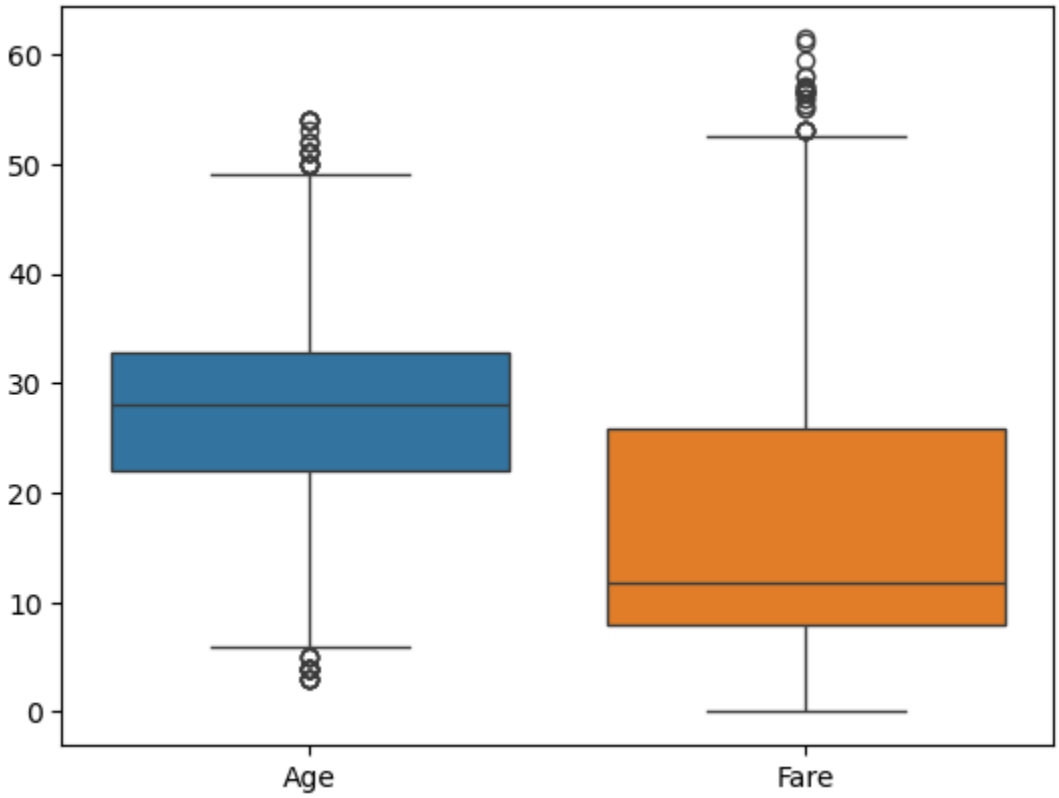
In [54]:
```
df['Age'] = df['Age'].fillna(df['Age'].median())
```

In [56]:
```
df['Embarked'] = df['Embarked'].fillna(df['Embarked'].mode()[0])
```

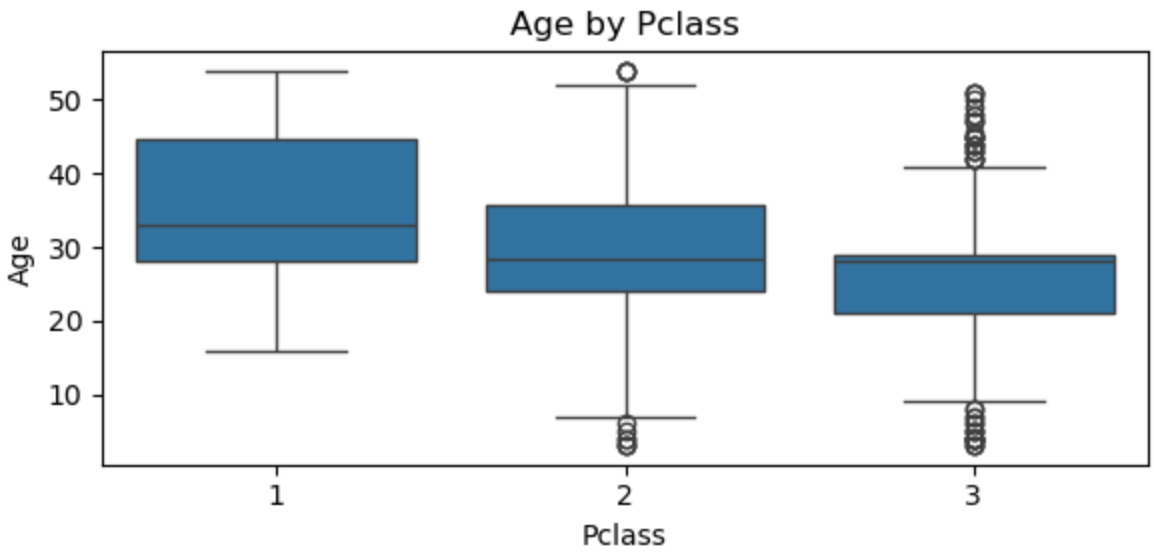
In [58]:
```
df.isnull().sum()
```

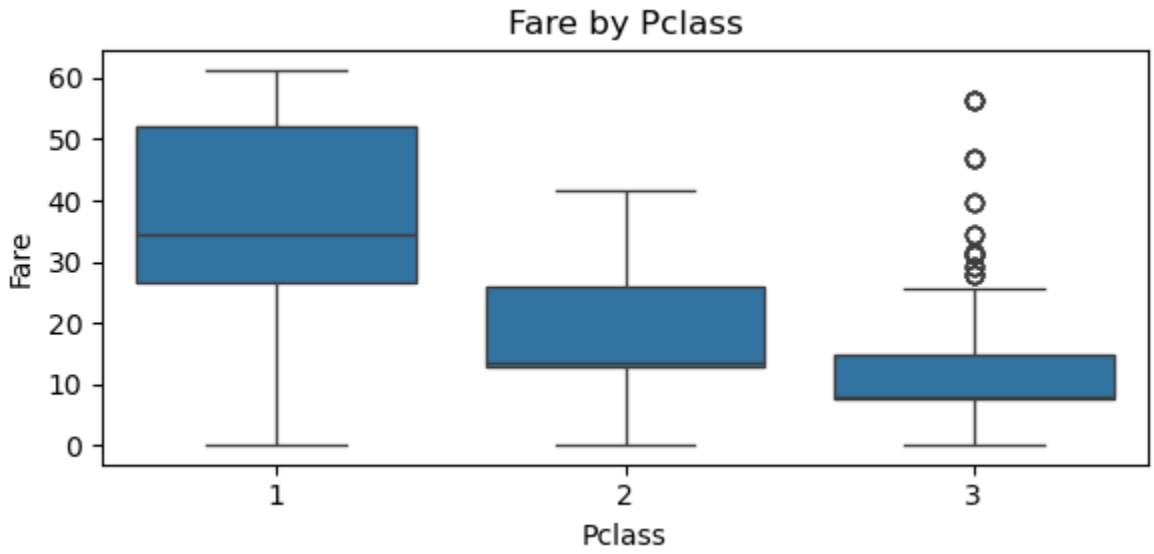
Out[58]:
```
Survived    0
Pclass      0
Sex         0
Age         0
SibSp       0
Parch       0
Fare        0
Embarked    0
dtype: int64
```

In [60]:
```
num_cols = ['Age', 'Fare']
for i in num_cols:
    df[i] = df[i].fillna(df[i].median())
sns.boxplot(data=df[num_cols])
plt.show()
```

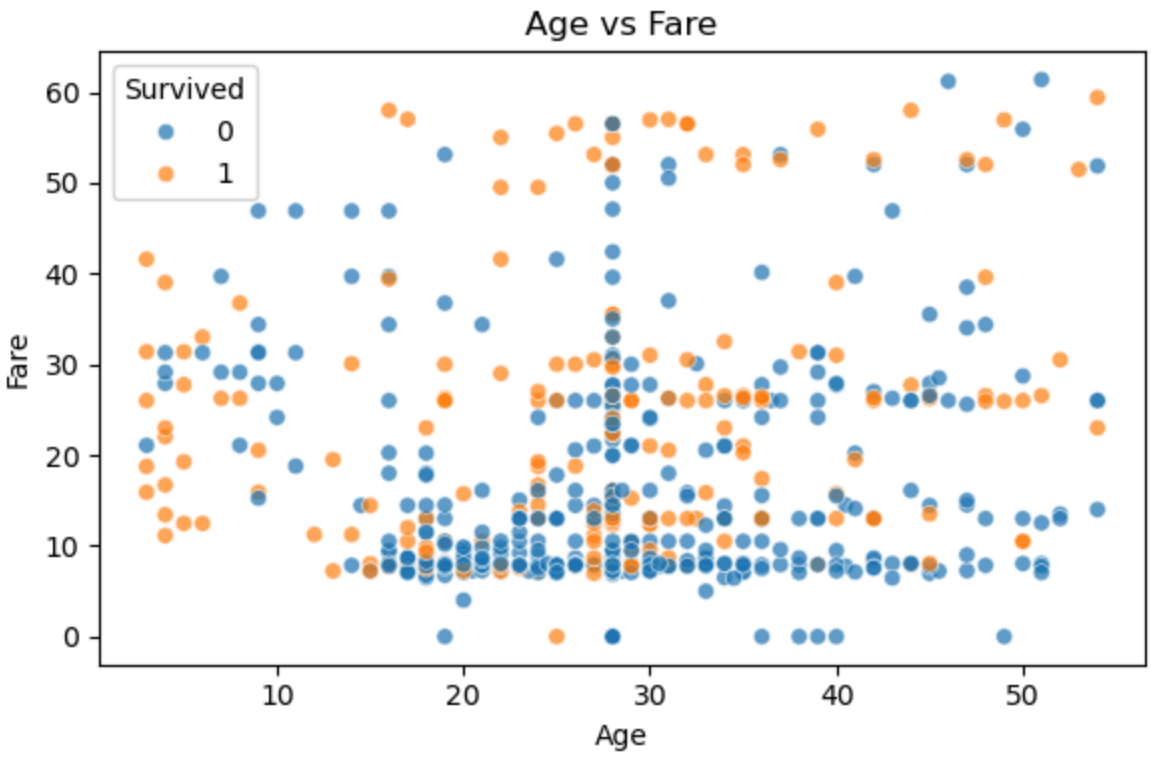


In [62]:
```
#  boxplots by Pclass
for col in ['Age', 'Fare']:
    if col in df.columns and 'Pclass' in df.columns:
        plt.figure(figsize=(6,3))
        sns.boxplot(x='Pclass', y=col, data=df)
        plt.title(f'{col} by Pclass'); plt.tight_layout(); plt.show()
```





In [64]:
```
# Age vs Fare scatter with Survived hue
if 'Age' in df.columns and 'Fare' in df.columns:
    plt.figure(figsize=(6,4))
    if 'Survived' in df.columns:
        sns.scatterplot(x='Age', y='Fare', hue='Survived', data=df, palette=Nc
    else:
        plt.scatter(df['Age'], df['Fare'], alpha=0.6)
    plt.title('Age vs Fare'); plt.tight_layout(); plt.show()
```

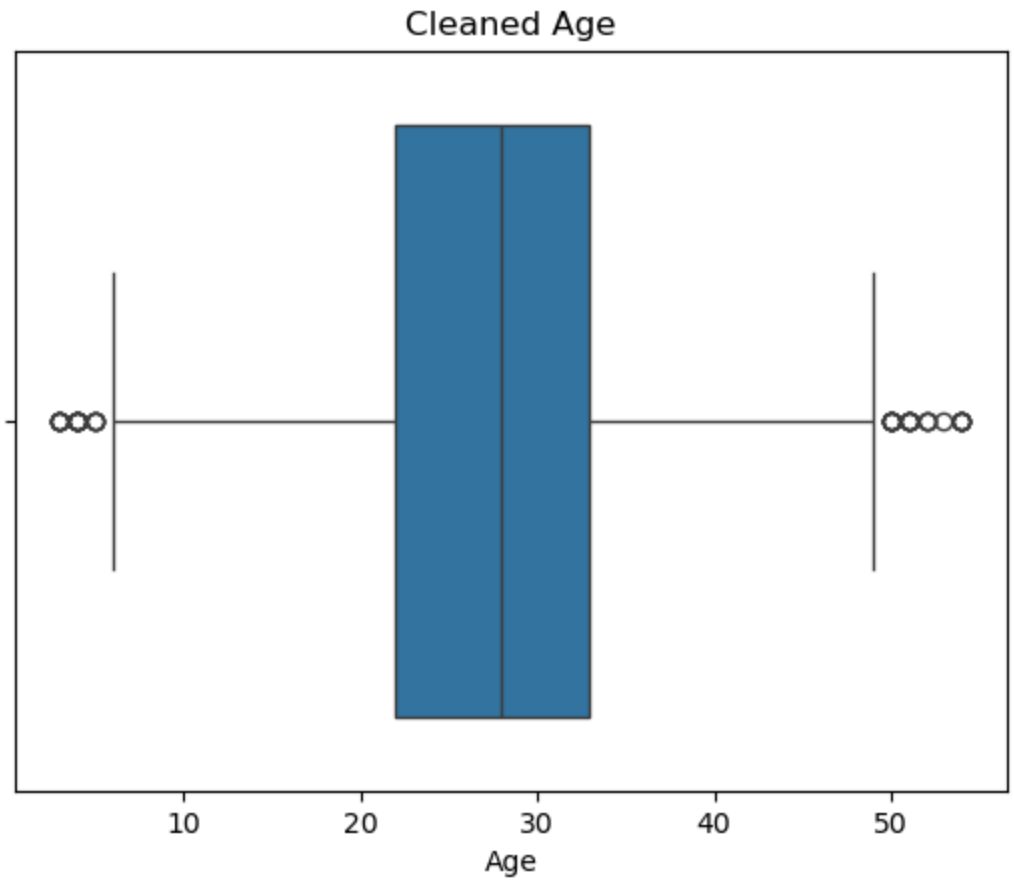


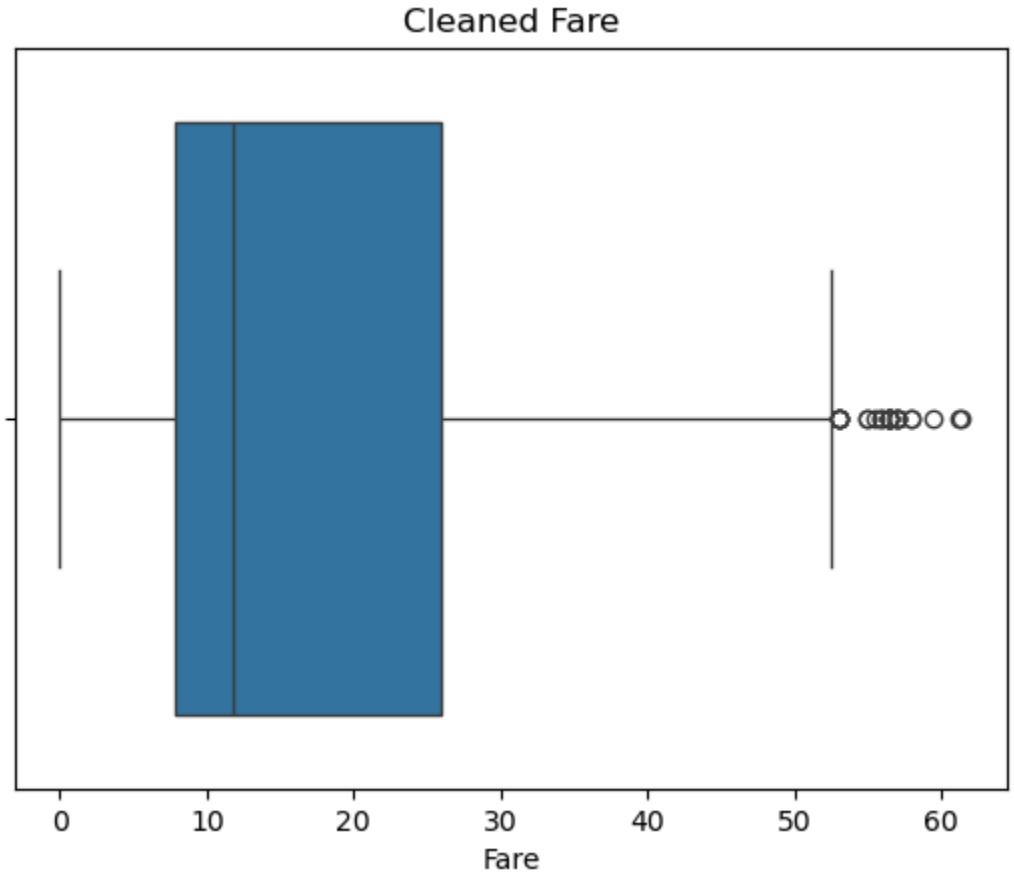
In [19]:
```
def remove_outliers_iqr(df, column):
    Q1 = df[column].quantile(0.25)
    Q3 = df[column].quantile(0.75)
    IQR = Q3 - Q1
    lower = Q1 - 1.5 * IQR
    upper = Q3 + 1.5 * IQR
    return df[(df[column] >= lower) & (df[column] <= upper)]
```

In [20]:
```
df = remove_outliers_iqr(df, 'Age')
df = remove_outliers_iqr(df, 'Fare')
```

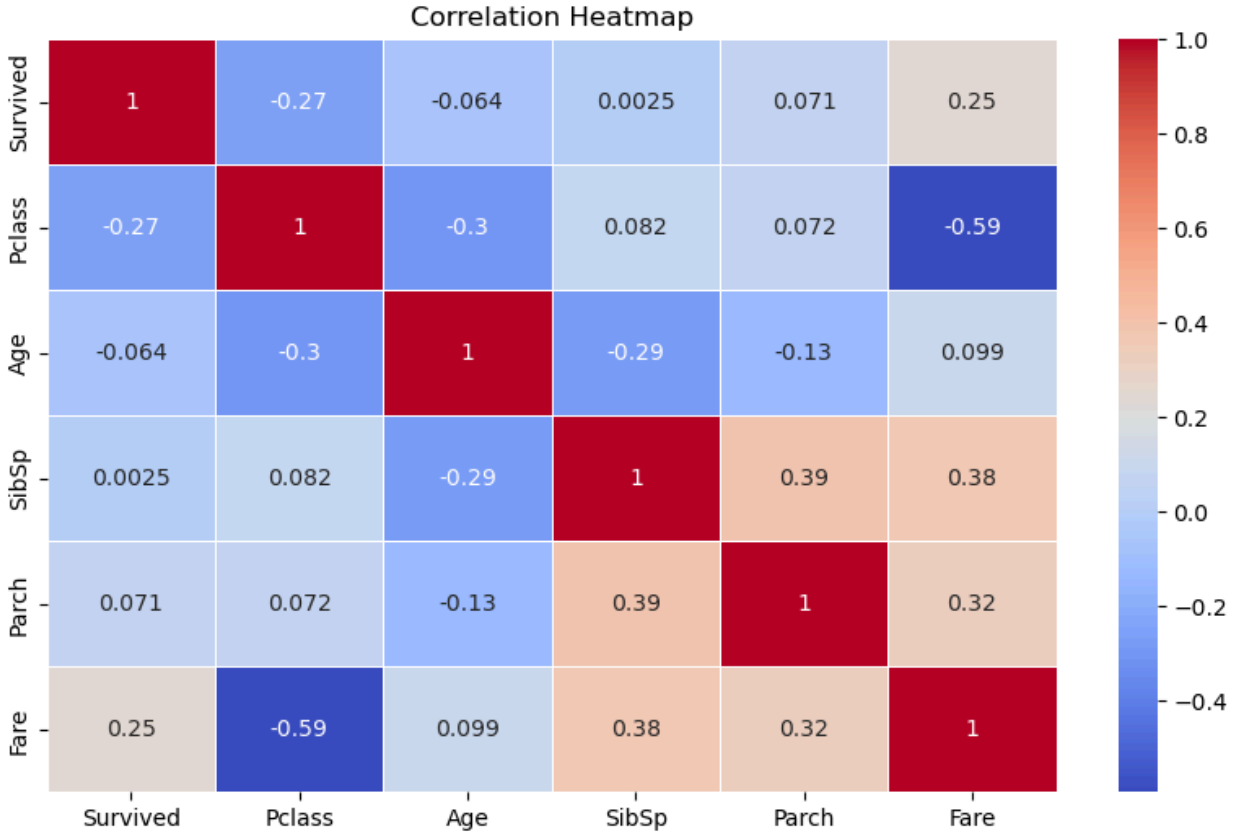
In [21]:
```
sns.boxplot(x=df['Age'])
plt.title('Cleaned Age')
plt.show()

sns.boxplot(x=df['Fare'])
plt.title('Cleaned Fare')
plt.show()
```

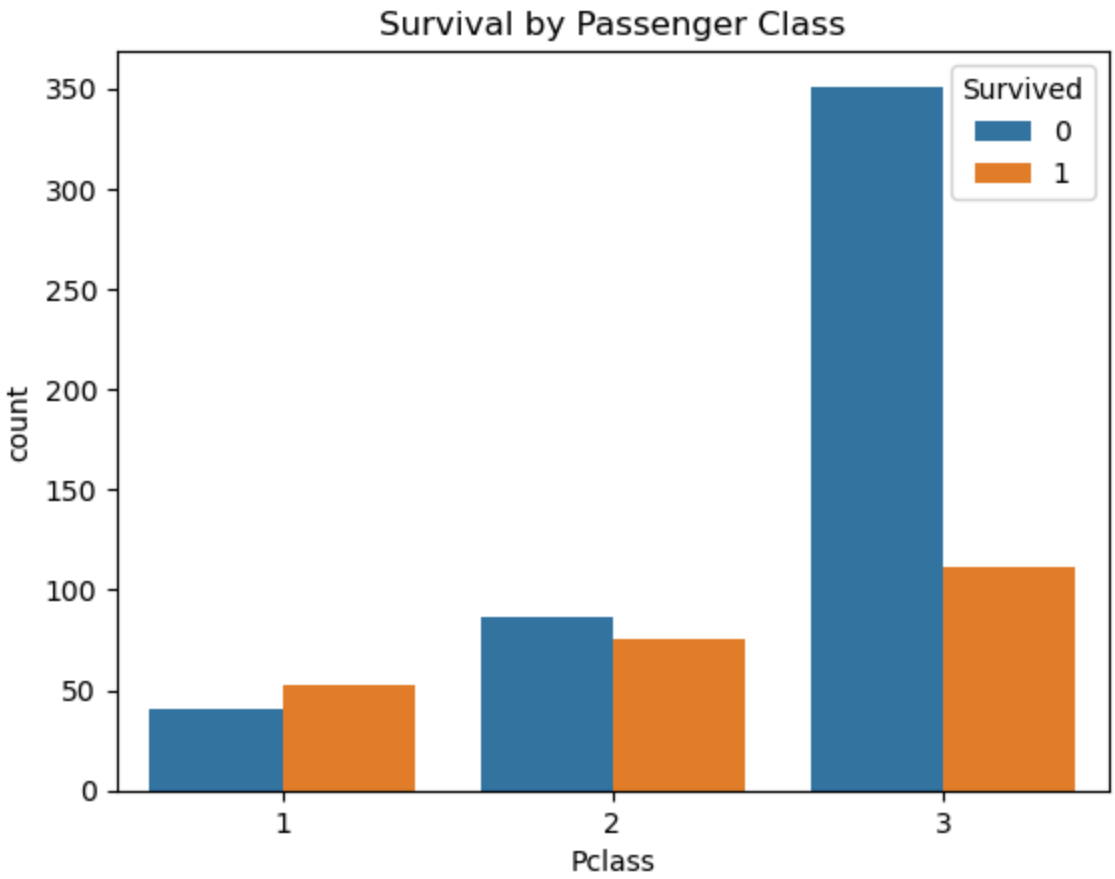

Cleaned Age
10
20
30
40
50
Age


Cleaned Fare
0
10
20
30
40
50
60
Fare

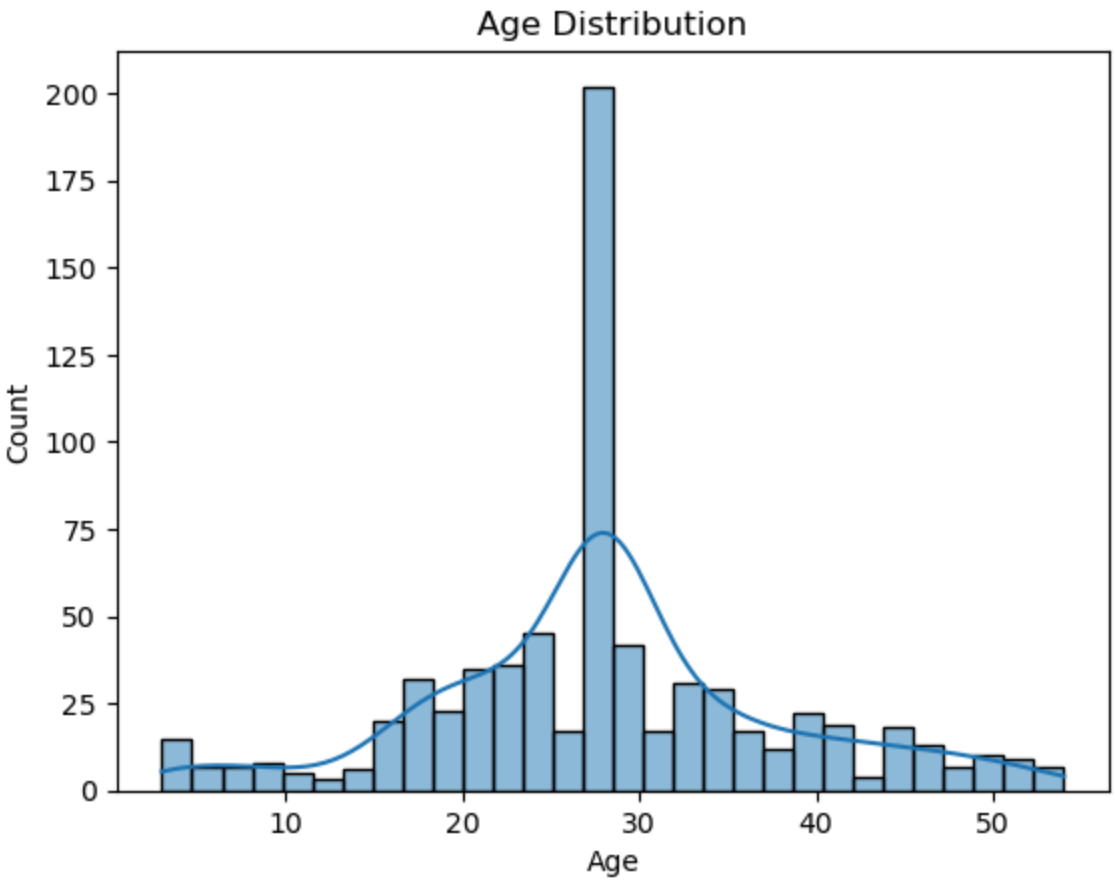
In [22]:
```
plt.figure(figsize=(10, 6))
sns.heatmap(df.select_dtypes(include='number').corr(), annot=True, cmap='coolw
plt.title("Correlation Heatmap")
plt.show()
```



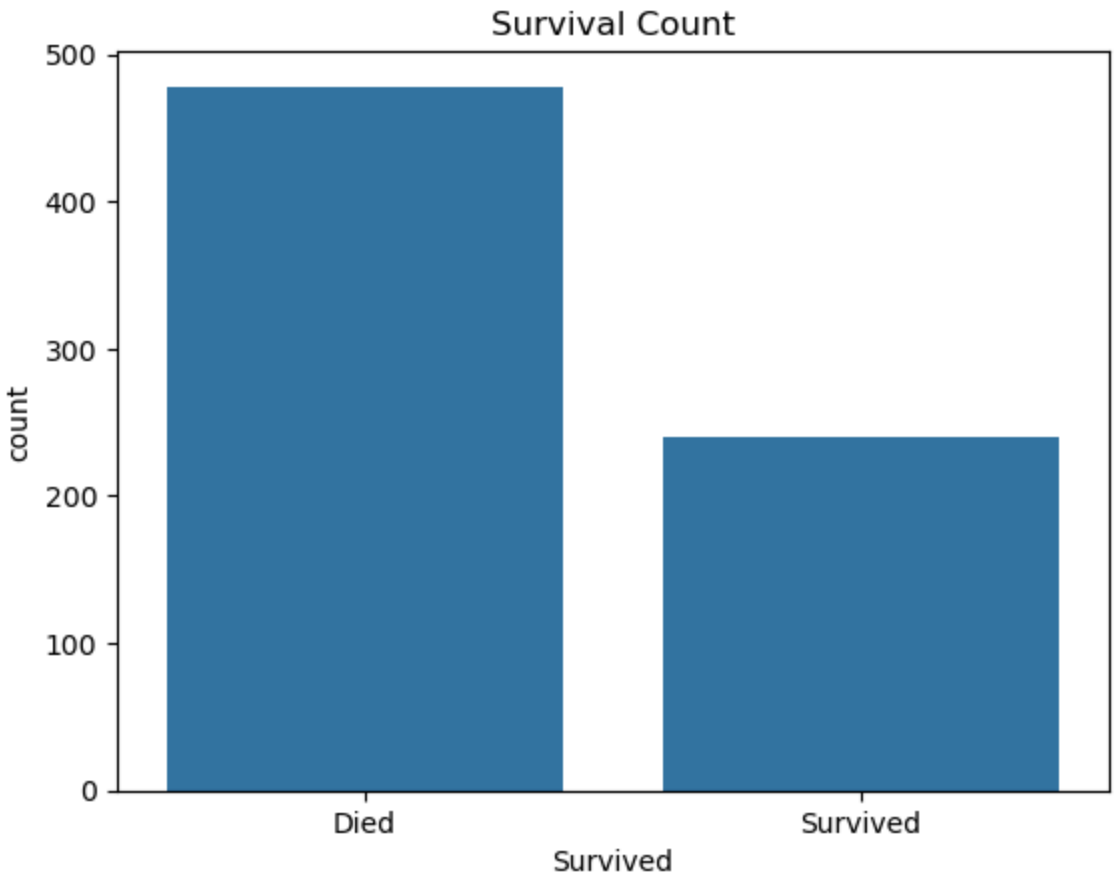
In [23]:
```
sns.countplot(x='Pclass', hue='Survived', data=df)
plt.title("Survival by Passenger Class")
plt.show()
```



In [24]:
```
sns.histplot(df['Age'], bins=30, kde=True)
plt.title("Age Distribution")
plt.show()
```



In [25]:
```
sns.countplot(x='Survived', data=df)
plt.title('Survival Count')
plt.xticks([0, 1], ['Died', 'Survived'])
plt.show()
```


Survival Count
500
400
300
200
100
0
count
Died
Survived
Survived

In [ ]: