1.Titanic EDA (Exploratory Data Analysis)

Dataset Overview

In [1]:
```
!pip install pandas
```

```
Requirement already satisfied: pandas in c:\users\dell\appdata\local\programs\python\python311\li
b\site-packages (2.2.3)
Requirement already satisfied: numpy>=1.23.2 in c:\users\dell\appdata\local\programs\python\pytho
n311\lib\site-packages (from pandas) (2.2.5)
Requirement already satisfied: python-dateutil>=2.8.2 in c:\users\dell\appdata\local\programs\pyt
hon\python311\lib\site-packages (from pandas) (2.8.2)
Requirement already satisfied: pytz>=2020.1 in c:\users\dell\appdata\local\programs\python\python
311\lib\site-packages (from pandas) (2025.2)
Requirement already satisfied: tzdata>=2022.7 in c:\users\dell\appdata\local\programs\python\pyth
on311\lib\site-packages (from pandas) (2025.2)
Requirement already satisfied: six>=1.5 in c:\users\dell\appdata\local\programs\python\python311
\lib\site-packages (from python-dateutil>=2.8.2->pandas) (1.16.0)
```

In [2]:
```
import pandas as pd
```

In [3]:
```
import pandas as pd
```

In [4]:
```
import pandas as pd
print(pd.__version__)
```

```
2.2.3
```

In [5]:
```
import os
print(os.getcwd())
```

```
C:\Users\DELL
```

In [7]:
```
df = pd.read_csv('train.csv')
```

In [8]:
```
import os
print(os.getcwd())
```

```
C:\Users\DELL
```

In [9]:
```
df.head()
```

Out[9]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Emba
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500	NaN	
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2833	C85	
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9250	NaN	
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1000	C123	
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	NaN	

In [ ]:

In [ ]:

2.Basic Info and Description

In [10]:

```
df.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
```

In [11]:

```
df.describe()
```

Out[11]:

	PassengerId	Survived	Pclass	Age	SibSp	Parch	Fare
count	891.000000	891.000000	891.000000	714.000000	891.000000	891.000000	891.000000
mean	446.000000	0.383838	2.308642	29.699118	0.523008	0.381594	32.204208
std	257.353842	0.486592	0.836071	14.526497	1.102743	0.806057	49.693429
min	1.000000	0.000000	1.000000	0.420000	0.000000	0.000000	0.000000
25%	223.500000	0.000000	2.000000	20.125000	0.000000	0.000000	7.910400
50%	446.000000	0.000000	3.000000	28.000000	0.000000	0.000000	14.454200
75%	668.500000	1.000000	3.000000	38.000000	1.000000	0.000000	31.000000
max	891.000000	1.000000	3.000000	80.000000	8.000000	6.000000	512.329200

In [12]:

```
df.head()
```

Out[12]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Emba
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500	NaN	
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2833	C85	
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9250	NaN	
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1000	C123	
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	NaN	

In [13]:

```
df.head(20)
```

Out[13]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	E
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500	NaN	
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2833	C85	
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9250	NaN	
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1000	C123	
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	NaN	
5	6	0	3	Moran, Mr. James	male	NaN	0	0	330877	8.4583	NaN	
6	7	0	1	McCarthy, Mr. Timothy J	male	54.0	0	0	17463	51.8625	E46	
7	8	0	3	Palsson, Master. Gosta Leonard	male	2.0	3	1	349909	21.0750	NaN	
8	9	1	3	Johnson, Mrs. Oscar W (Elisabeth Vilhelmina Berg)	female	27.0	0	2	347742	11.1333	NaN	
9	10	1	2	Nasser, Mrs. Nicholas (Adele Achem)	female	14.0	1	0	237736	30.0708	NaN	
10	11	1	3	Sandstrom, Miss. Marguerite Rut	female	4.0	1	1	PP 9549	16.7000	G6	
11	12	1	1	Bonnell, Miss. Elizabeth	female	58.0	0	0	113783	26.5500	C103	
12	13	0	3	Saundercock, Mr. William Henry	male	20.0	0	0	A/5. 2151	8.0500	NaN	
13	14	0	3	Andersson, Mr. Anders Johan	male	39.0	1	5	347082	31.2750	NaN	
14	15	0	3	Vestrom, Miss. Hulda	female	14.0	0	0	350406	7.8542	NaN	

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	E
				Amanda Adolfina								
15	16	1	2	Hewlett, Mrs. (Mary D Kingcome)	female	55.0	0	0	248706	16.0000	NaN	
16	17	0	3	Rice, Master. Eugene	male	2.0	4	1	382652	29.1250	NaN	
17	18	1	2	Williams, Mr. Charles Eugene	male	NaN	0	0	244373	13.0000	NaN	
18	19	0	3	Vander Planke, Mrs. Julius (Emelia Maria Vande...	female	31.0	1	0	345763	18.0000	NaN	
19	20	1	3	Masselmani, Mrs. Fatima	female	NaN	0	0	2649	7.2250	NaN	

In [ ]:

In [ ]:

Value Counts for 'Survived'

In [28]:

```
# Check value counts for important columns (example: 'Survived', 'Pclass', 'Sex')
print(df['Survived'].value_counts())
print(df['Pclass'].value_counts())
print(df['Sex'].value_counts())
```

```
Survived
0    549
1    342
Name: count, dtype: int64
Pclass
3    491
1    216
2    184
Name: count, dtype: int64
Sex
male      577
female    314
Name: count, dtype: int64
```

In [ ]:

In [ ]:

3.Visual Exploration – Pairplot

a.Pairplot to see relationships between features

In [7]:

```
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
```

In [8]:

```
df = pd.read_csv('train.csv')
```

In [9]:

```
df.head()
```

Out[9]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Emba
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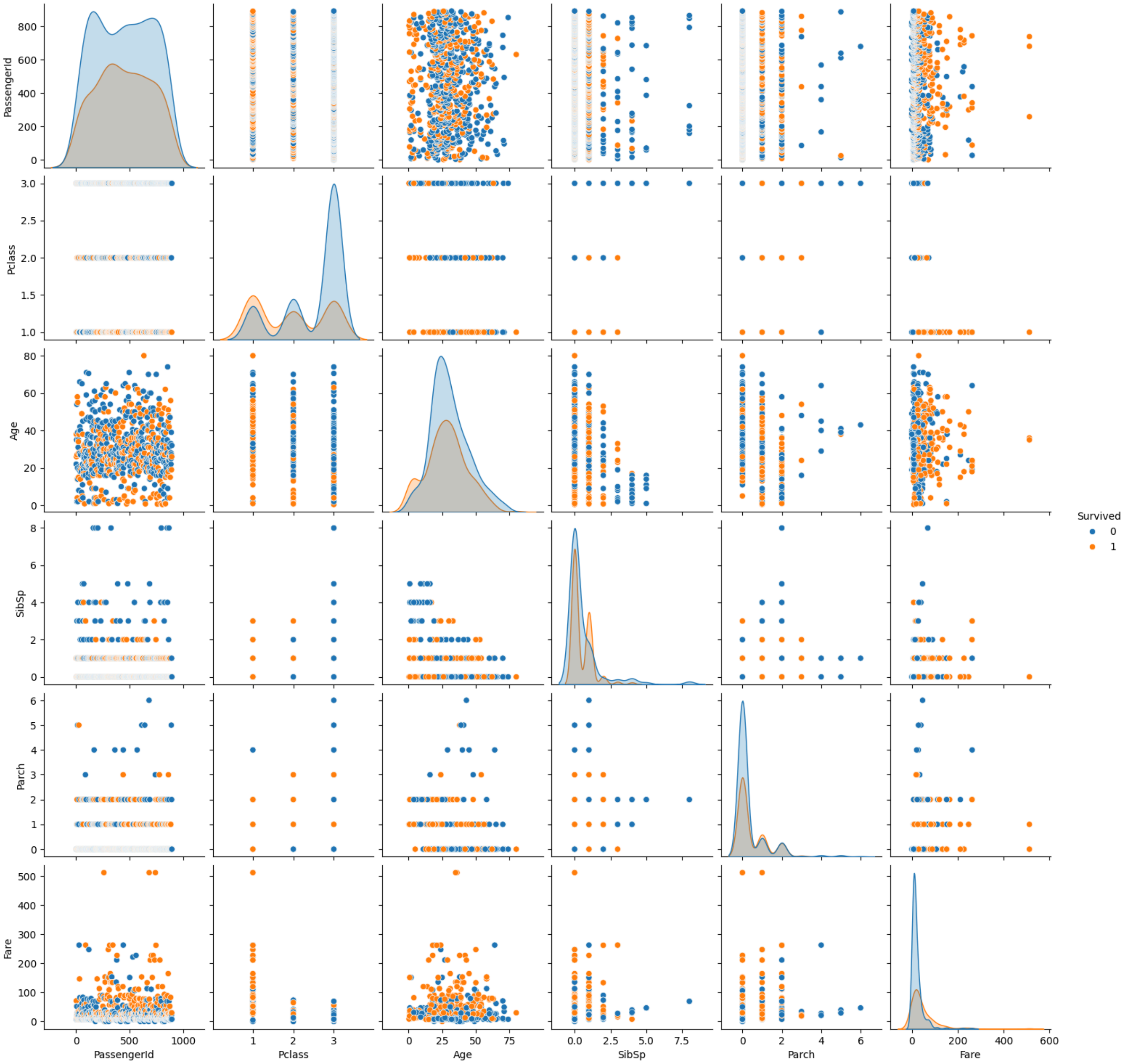
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1000	C123	
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	NaN	

In [10]:

```
sns.pairplot(df, hue='Survived')
plt.show()
```



Observation:

Survivors tend to be younger and belong to higher passenger classes (Pclass 1). Fare is higher among survivors.

In [ ]:

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b.Heatmap to see correlation between variables

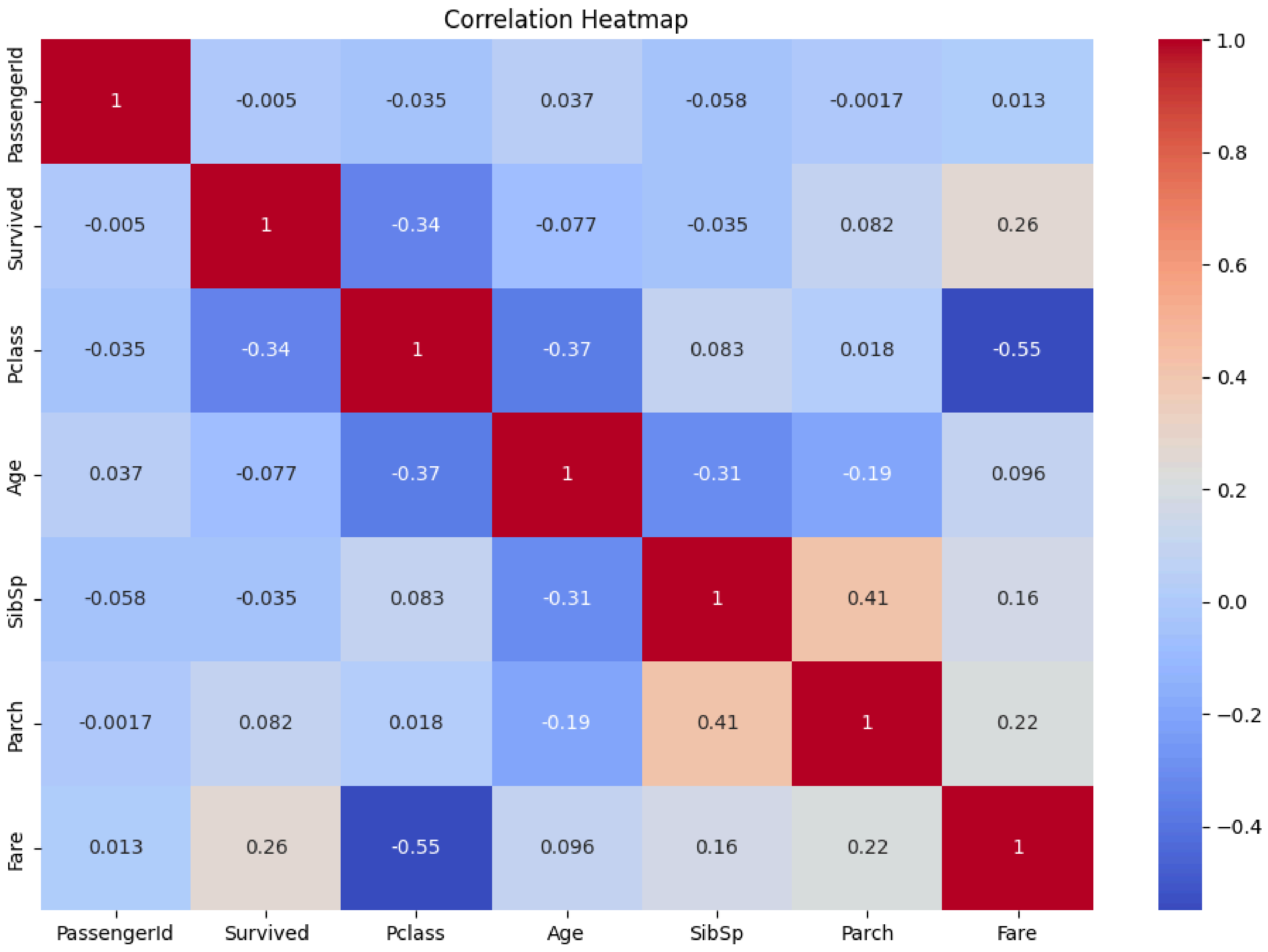
In [12]:

```
plt.figure(figsize=(12, 8))

# Select only numeric columns before computing correlation
numeric_df = df.select_dtypes(include=['number'])

sns.heatmap(numeric_df.corr(), annot=True, cmap='coolwarm')
```

```
plt.title('Correlation Heatmap')
plt.show()
```



	PassengerId	Survived	Pclass	Age	SibSp	Parch	Fare
PassengerId	1	-0.005	-0.035	0.037	-0.058	-0.0017	0.013
Survived	-0.005	1	-0.34	-0.077	-0.035	0.082	0.26
Pclass	-0.035	-0.34	1	-0.37	0.083	0.018	-0.55
Age	0.037	-0.077	-0.37	1	-0.31	-0.19	0.096
SibSp	-0.058	-0.035	0.083	-0.31	1	0.41	0.16
Parch	-0.0017	0.082	0.018	-0.19	0.41	1	0.22
Fare	0.013	0.26	-0.55	0.096	0.16	0.22	1

Observation:

Strong positive correlation between Fare and Survived. Strong negative correlation between Pclass and Survived.

In [ ]:

In [ ]:

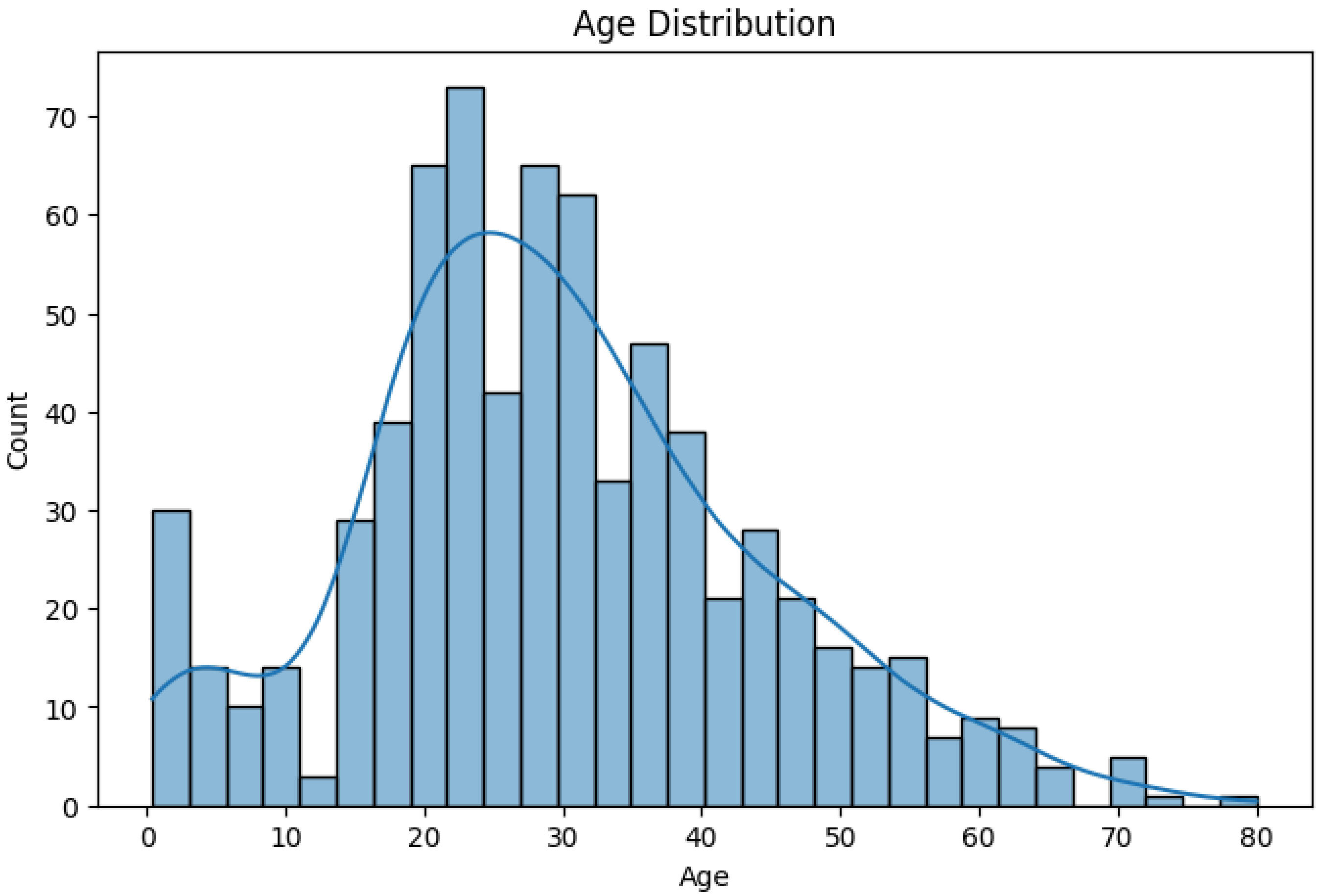
4.Plotting Histograms, Boxplots, and Scatterplots

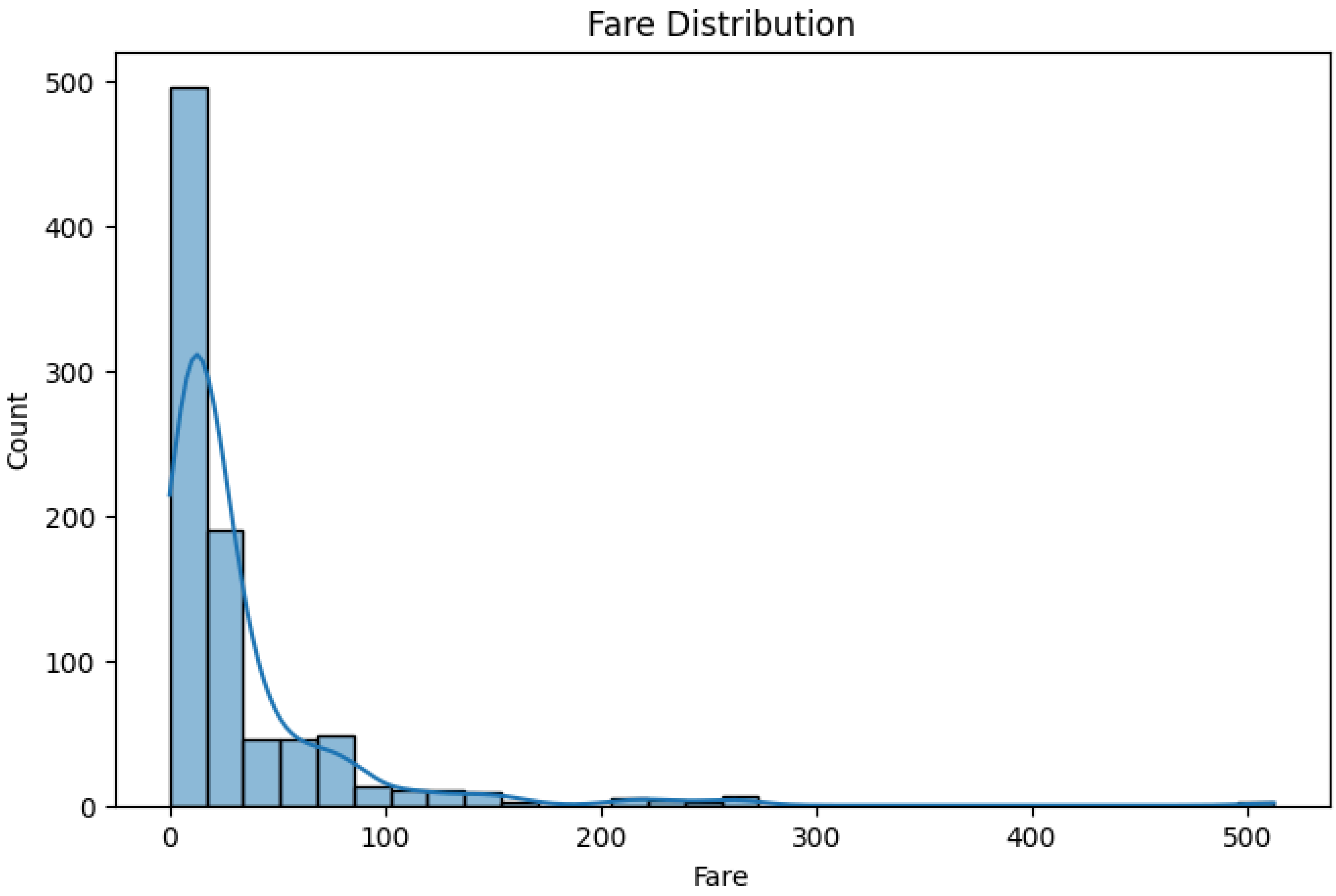
(a) Histograms for Age, Fare

In [13]:

```
# Histogram of Age
plt.figure(figsize=(8,5))
sns.histplot(df['Age'], bins=30, kde=True)
plt.title('Age Distribution')
plt.xlabel('Age')
plt.ylabel('Count')
plt.show()

# Histogram of Fare
plt.figure(figsize=(8,5))
sns.histplot(df['Fare'], bins=30, kde=True)
plt.title('Fare Distribution')
plt.xlabel('Fare')
plt.ylabel('Count')
plt.show()
```





Observation:

Most passengers are aged between 20–40 years.

In [ ]:

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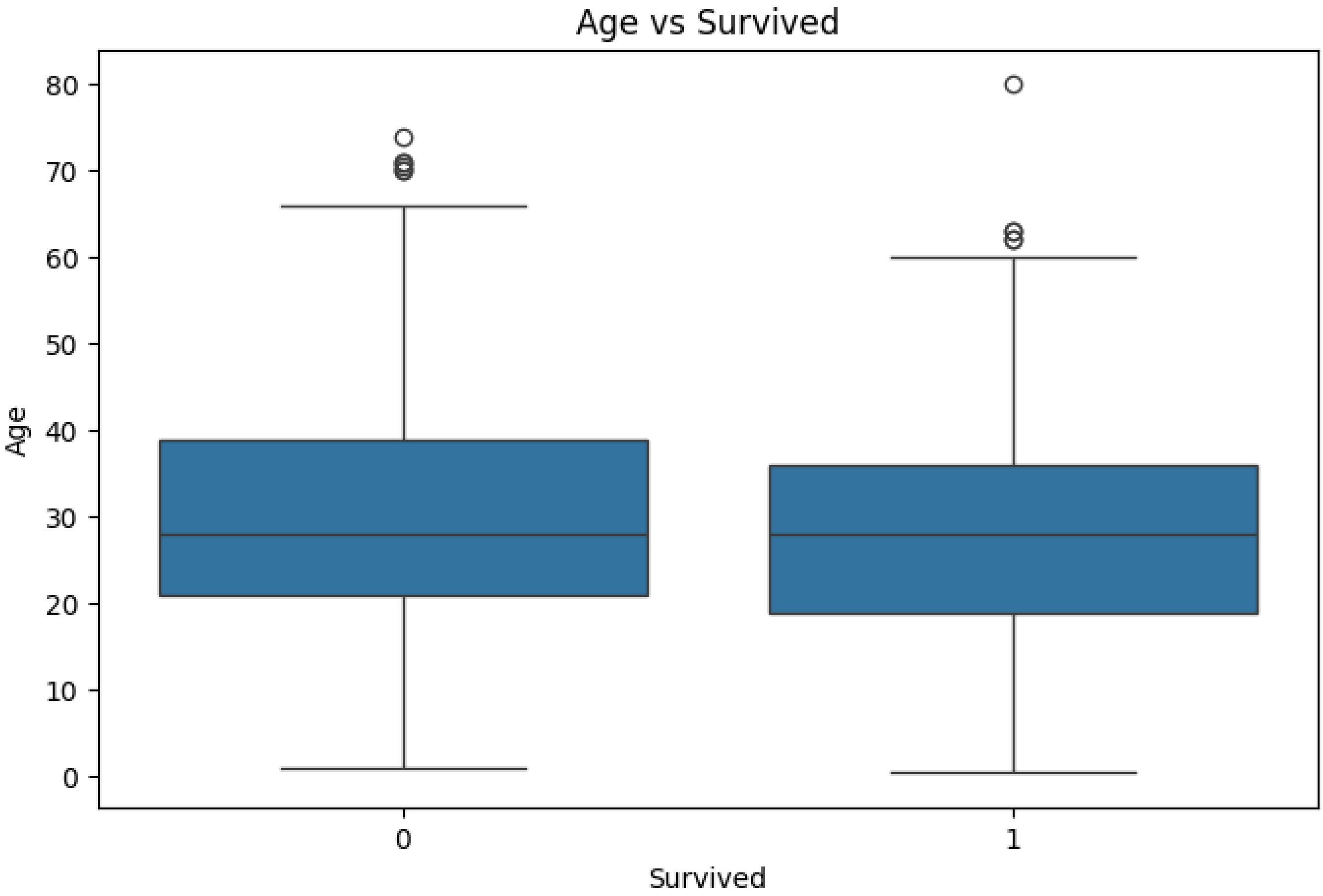
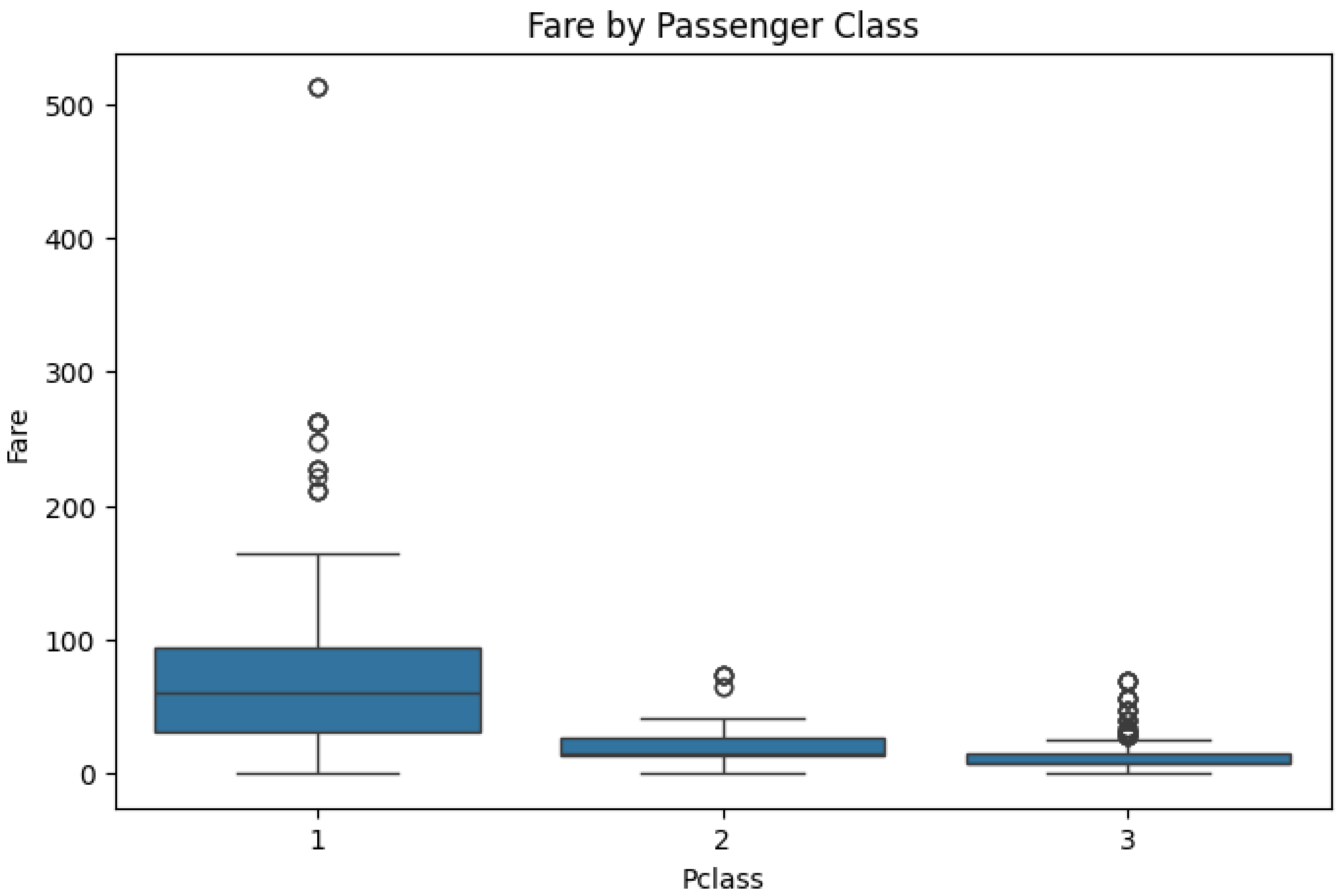
(b) Boxplots (for Age vs Survived, Fare vs Pclass)

In [14]:

```
# Boxplot of Age vs Survived
plt.figure(figsize=(8,5))
sns.boxplot(x='Survived', y='Age', data=df)
plt.title('Age vs Survived')
plt.show()

# Boxplot of Fare vs Pclass
plt.figure(figsize=(8,5))
sns.boxplot(x='Pclass', y='Fare', data=df)
plt.title('Fare by Passenger Class')
plt.show()
```





Observation:

Younger passengers show higher survival rates. Median age of survivors is lower than that of non-survivors.

In [ ]:

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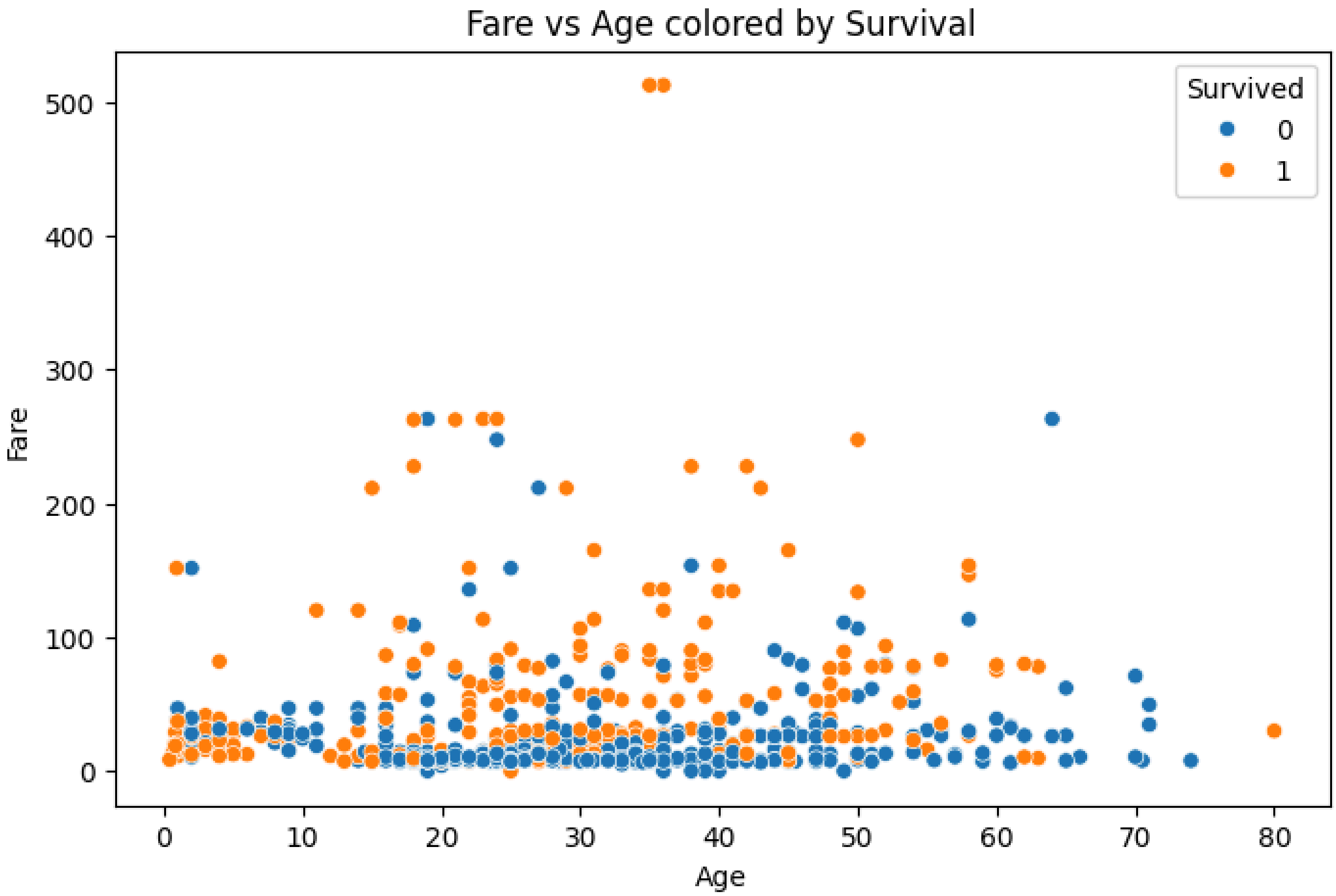
(c) Scatterplot (Fare vs Age)

In [16]:

```python
# Scatterplot of Fare vs Age
plt.figure(figsize=(8,5))
sns.scatterplot(x='Age', y='Fare', hue='Survived', data=df)
plt.title('Fare vs Age colored by Survival')
plt.show()
```



Observation:

Higher Fare correlates with survival. Older passengers paying low fare had lower survival chances.

In [ ]:

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Summary of Findings

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Summary:

- Most passengers were aged between 20–40 years.
- Passengers in 1st class had higher survival rates.
- Females had much higher survival chances than males.
- Higher fare passengers were more likely to survive.
- Missing values in Age and Embarked were handled.
- Cabin was dropped due to too much missing data.

In [ ]: