```
# Importing all necessary libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

# For inline plotting
%matplotlib inline

# Set style for seaborn
sns.set(style="whitegrid")
```

```
# Load Titanic dataset directly from seaborn
titanic = sns.load_dataset('titanic')

# Display first 5 rows
display(titanic.head())
```

	survived	pclass	sex	age	sibsp	parch	fare	embarked	class	who	adult_male	deck	embark_town	alive	alone
0	0	3	male	22.0	1	0	7.2500	S	Third	man	True	NaN	Southampton	no	False
1	1	1	female	38.0	1	0	71.2833	C	First	woman	False	C	Cherbourg	yes	False
2	1	3	female	26.0	0	0	7.9250	S	Third	woman	False	NaN	Southampton	yes	True
3	1	1	female	35.0	1	0	53.1000	S	First	woman	False	C	Southampton	yes	False
4	0	3	male	35.0	0	0	8.0500	S	Third	man	True	NaN	Southampton	no	True

```
# Basic information about the dataset
titanic.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
Data columns (total 15 columns):
 #   Column       Non-Null Count  Dtype
---  ------       --------------  -----
 0   survived     891 non-null    int64
 1   pclass       891 non-null    int64
 2   sex          891 non-null    object
 3   age          714 non-null    float64
 4   sibsp        891 non-null    int64
 5   parch        891 non-null    int64
 6   fare         891 non-null    float64
 7   embarked     889 non-null    object
 8   class        891 non-null    category
 9   who          891 non-null    object
 10  adult_male   891 non-null    bool
 11  deck         203 non-null    category
 12  embark_town  889 non-null    object
 13  alive        891 non-null    object
 14  alone        891 non-null    bool
dtypes: bool(2), category(2), float64(2), int64(4), object(5)
memory usage: 80.7+ KB
```

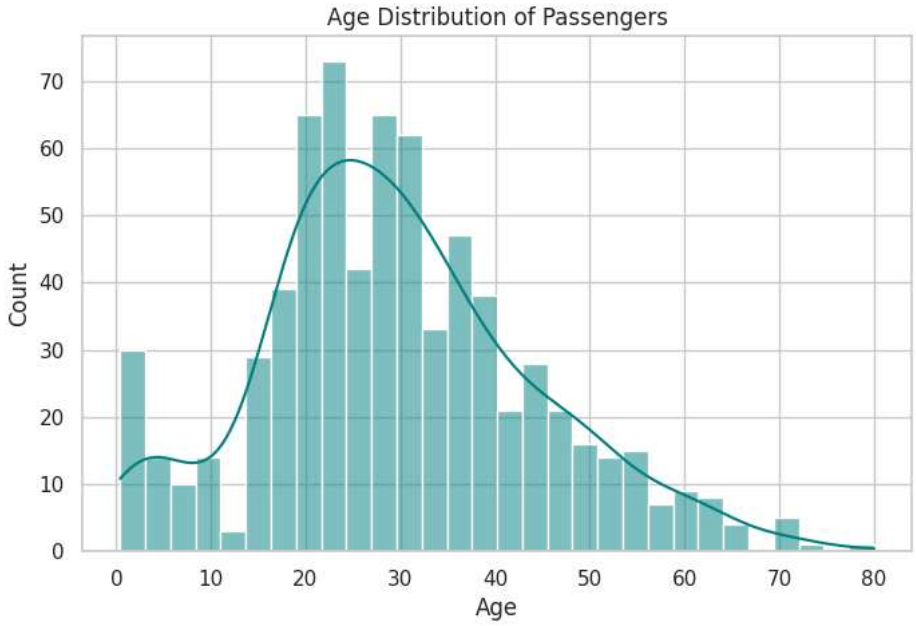
```
# Statistical summary
titanic.describe(include='all')
```

	survived	pclass	sex	age	sibsp	parch	fare	embarked	class	who	adult_male	deck	embark_tou
count	891.000000	891.000000	891	714.000000	891.000000	891.000000	891.000000	889	891	891	891	203	8
unique	NaN	NaN	2	NaN	NaN	NaN	NaN	3	3	3	2	7	
top	NaN	NaN	male	NaN	NaN	NaN	NaN	S	Third	man	True	C	Southampt
std	0.486592	0.836071	NaN	14.526497	1.102743	0.806057	49.693429	NaN	NaN	NaN	NaN	NaN	Na
min	0.000000	1.000000	NaN	0.420000	0.000000	0.000000	0.000000	NaN	NaN	NaN	NaN	NaN	Na
50%	0.000000	3.000000	NaN	28.000000	0.000000	0.000000	14.454200	NaN	NaN	NaN	NaN	NaN	Na
max	1.000000	3.000000	NaN	80.000000	8.000000	6.000000	512.329200	NaN	NaN	NaN	NaN	NaN	Na

```
# Checking missing values
titanic.isnull().sum()
```

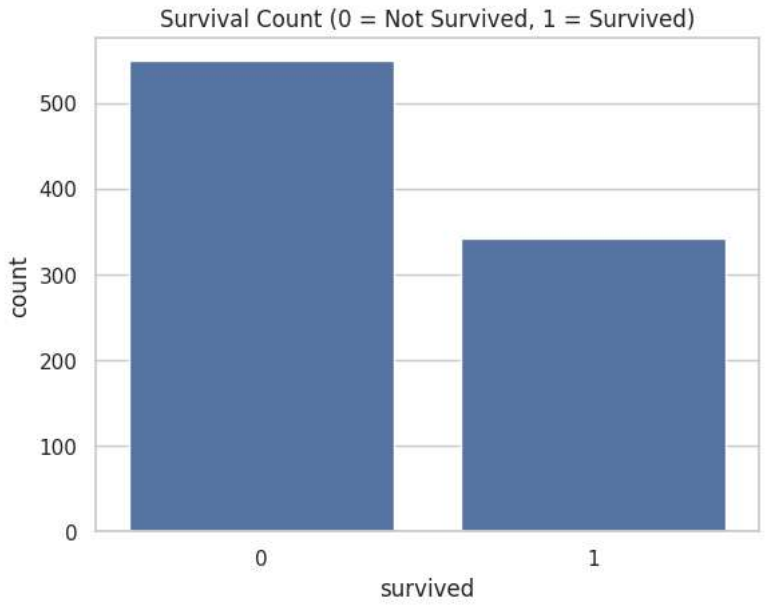
```
survived         0
pclass           0
sex              0
age            177
sibsp            0
parch            0
fare             0
embarked         2
class            0
who              0
adult_male       0
deck           688
embark_town      2
alive            0
alone            0
dtype: int64
```

```
plt.figure(figsize=(8,5))
sns.histplot(titanic['age'], bins=30, kde=True, color='teal')
plt.title("Age Distribution of Passengers")
plt.xlabel("Age")
plt.ylabel("Count")
plt.show()
```



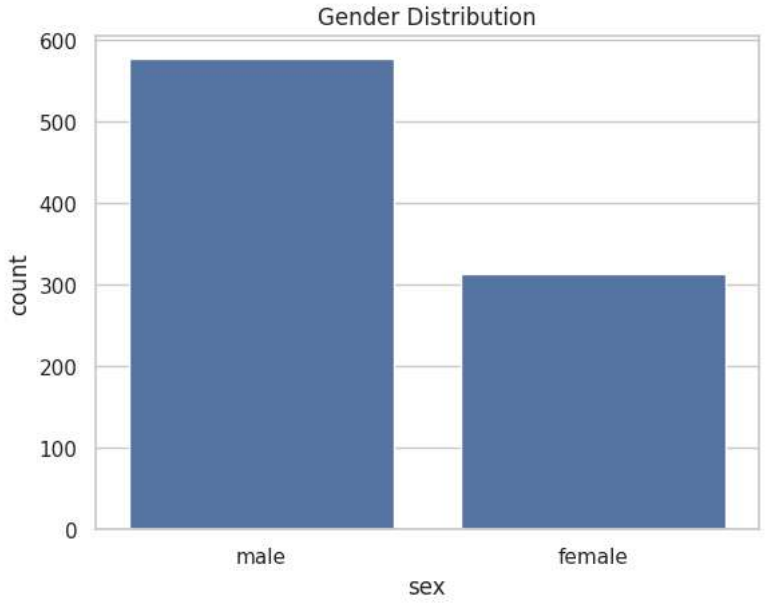
Observation: Most passengers are between 20–40 years old.

```
sns.countplot(x='survived', data=titanic)
plt.title("Survival Count (0 = Not Survived, 1 = Survived)")
plt.show()
```



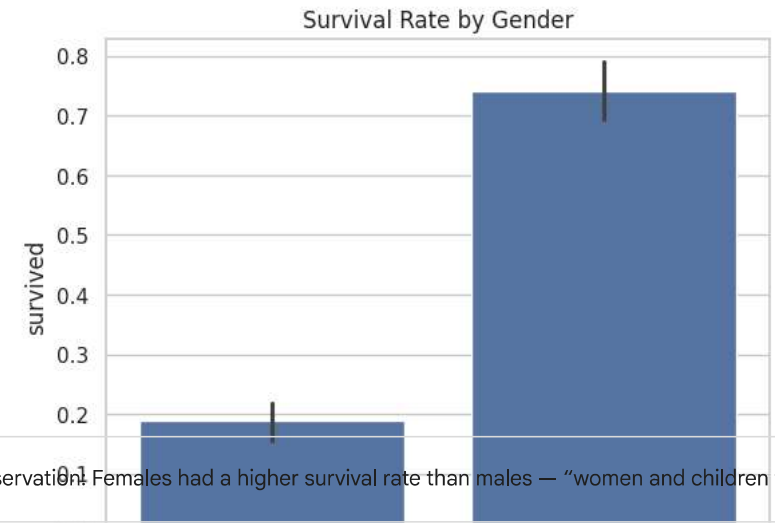
Observation: There are more passengers who did not survive (0) than those who survived (1).

```
sns.countplot(x='sex', data=titanic)
plt.title("Gender Distribution")
plt.show()
```



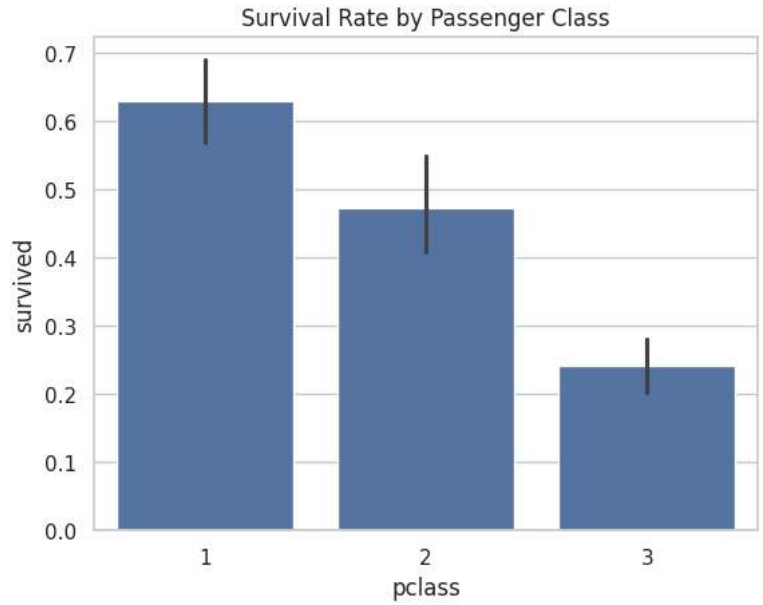
Observation: There are more male passengers than female passengers on the ship.

```
sns.barplot(x='sex', y='survived', data=titanic)
plt.title("Survival Rate by Gender")
plt.show()
```



Observation: Females had a higher survival rate than males — “women and children first” rule.

```
sns.barplot(x='pclass', y='survived', data=titanic)
plt.title("Survival Rate by Passenger Class")
plt.show()
```



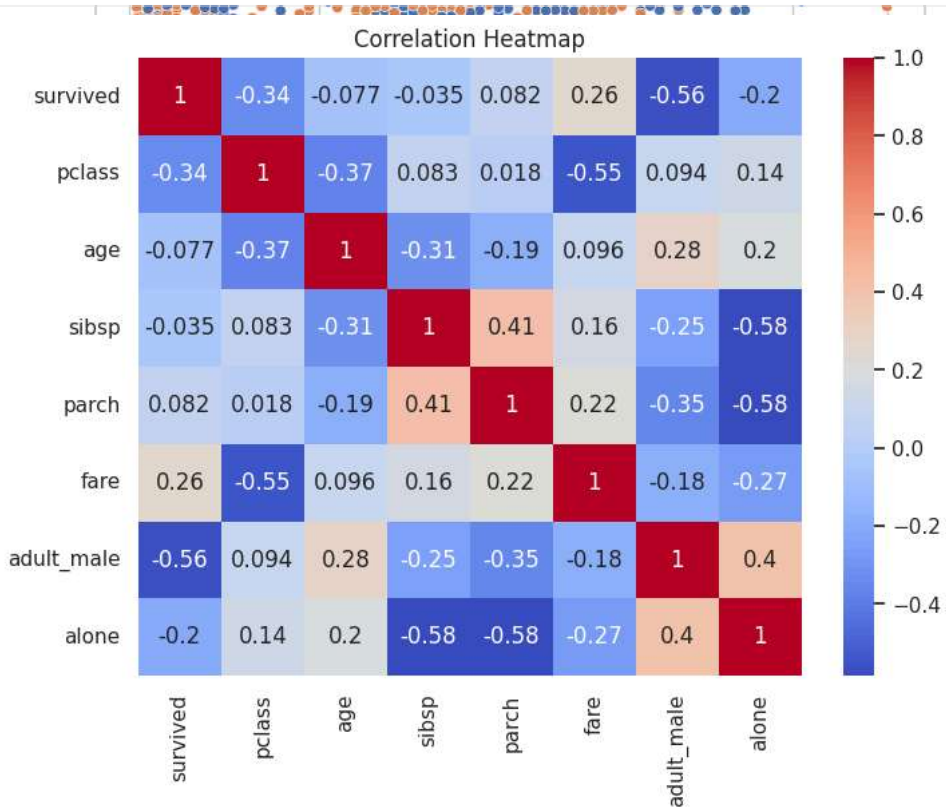
Observation: Survival chances were highest for 1st class passengers, and lowest for 3rd class.

```
plt.figure(figsize=(8,6))
sns.scatterplot(x='age', y='fare', hue='survived', data=titanic)
plt.title("Age vs Fare (Colored by Survival)")
plt.show()
```

Observation: Survivors tend to have paid higher fares and are often younger.

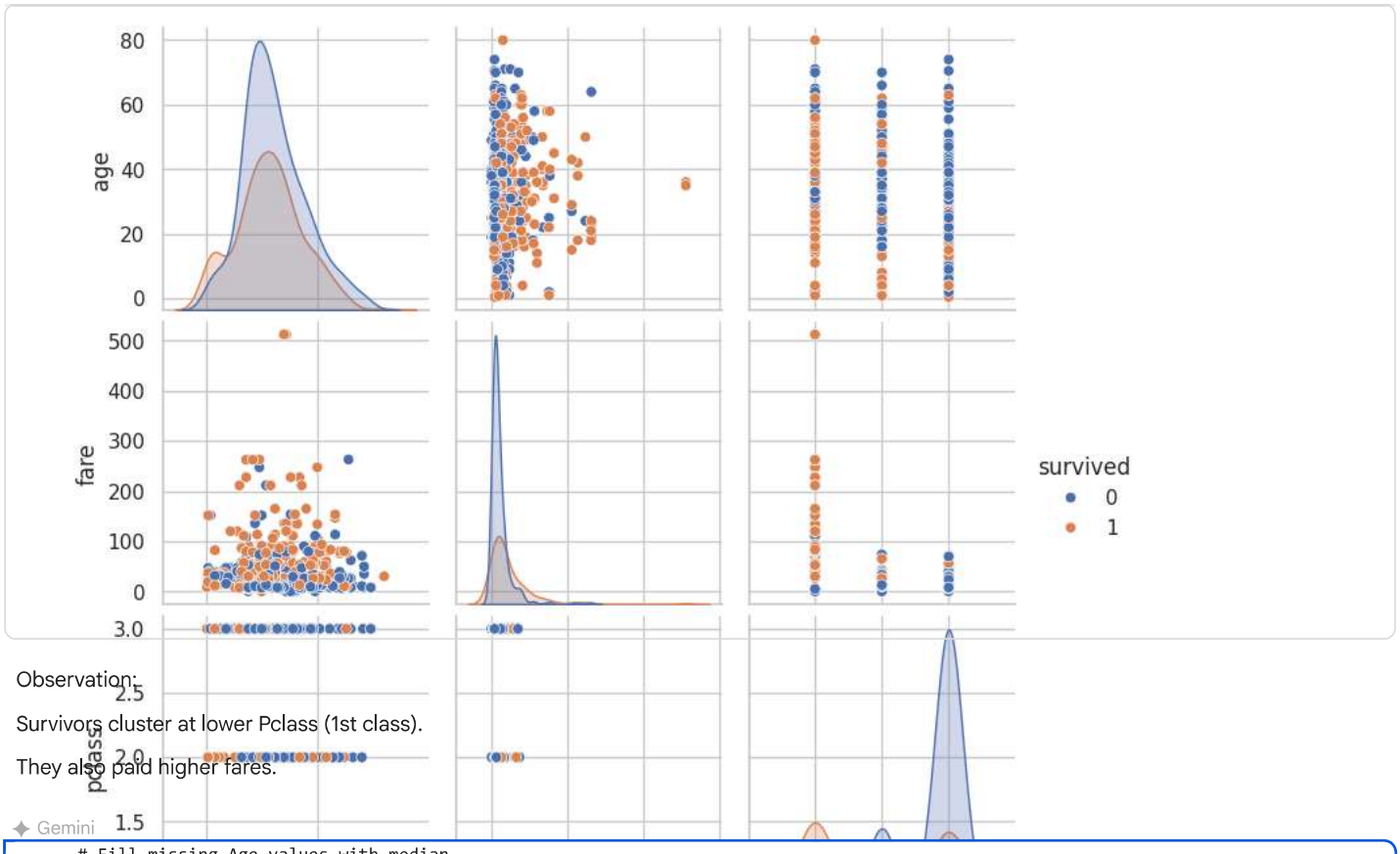
Start coding or generate with AI.

```
plt.figure(figsize=(8,6))
sns.heatmap(titanic.corr(numeric_only=True), annot=True, cmap='coolwarm')
plt.title("Correlation Heatmap")
plt.show()
```



Fare and Pclass are moderately correlated — wealthier passengers had higher class tickets and survived more.

```
sns.pairplot(titanic[['survived', 'age', 'fare', 'pclass']], hue='survived')
plt.show()
```



Observation:

Survivors cluster at lower Pclass (1st class).

They also paid higher fares.

✦ Gemini

```
# Fill missing Age values with median
titanic['age'].fillna(titanic['age'].median(), inplace=True)

# Fill missing Embarked values with mode
titanic['embarked'].fillna(titanic['embarked'].mode()[0], inplace=True)

# Fill missing embark_town values with mode
titanic['embark_town'].fillna(titanic['embark_town'].mode()[0], inplace=True)

# Drop the 'deck' column as it has too many missing values
titanic.drop('deck', axis=1, inplace=True)

# Check again
titanic.isnull().sum()
```

```
/tmp/ipython-input-516596697.py:2: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained ass
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are setting v

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[col


  titanic['age'].fillna(titanic['age'].median(), inplace=True)
/tmp/ipython-input-516596697.py:5: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained ass
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are setting v

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[col


  titanic['embarked'].fillna(titanic['embarked'].mode()[0], inplace=True)
```

```
survived         0
pclass           0
sex              0
age              0
sibsp            0
parch            0
fare             0
embarked         2
class            0
who              0
adult_male       0
deck           688
embark_town      2
alive            0
alone            0
dtype: int64
```

```
from IPython.display import Markdown as md
md("""
### 🧩 Summary of Insights (Titanic Kaggle Dataset)

1. Most passengers were **male** (approx. 65%).
2. Overall survival rate is around **38%**.
3. **Females** had a much higher survival rate than males.
4. **1st class passengers** survived the most, followed by 2nd, then 3rd.
5. **Younger passengers** (especially children) had better chances.
6. **Fare** is positively correlated with survival — wealthier passengers survived more.
7. Missing data mainly occurred in `Age` and `Cabin`.
""")
```

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