Titanic Dataset - Data Cleaning and Exploratory Data Analysis (EDA)

In [33]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.ensemble import RandomForestClassifier
```

Importing the Dataset

In [34]:
```
train_data = pd.read_csv("train.csv")
train_data
```

Out[34]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500	NaN	S
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2833	C85	C
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9250	NaN	S
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1000	C123	S
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	NaN	S
...	...	...	...	...	...	...	...	...	...	...	...	...
886	887	0	2	Montvila, Rev. Juozas	male	27.0	0	0	211536	13.0000	NaN	S
887	888	1	1	Graham, Miss. Margaret Edith	female	19.0	0	0	112053	30.0000	B42	S
888	889	0	3	Johnston, Miss. Catherine Helen "Carrie"	female	NaN	1	2	W./C. 6607	23.4500	NaN	S
889	890	1	1	Behr, Mr. Karl Howell	male	26.0	0	0	111369	30.0000	C148	C
890	891	0	3	Dooley, Mr. Patrick	male	32.0	0	0	370376	7.7500	NaN	Q

891 rows × 12 columns

Checking data for various Information

In [35]:
```
train_data.head()
```

Out[35]:

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

In [36]:
```
train_data.tail()
```

Out[36]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
886	887	0	2	Montvila, Rev. Juozas	male	27.0	0	0	211536	13.00	NaN	S
887	888	1	1	Graham, Miss. Margaret Edith	female	19.0	0	0	112053	30.00	B42	S
888	889	0	3	Johnston, Miss. Catherine Helen "Carrie"	female	NaN	1	2	W./C. 6607	23.45	NaN	S
889	890	1	1	Behr, Mr. Karl Howell	male	26.0	0	0	111369	30.00	C148	C
890	891	0	3	Dooley, Mr. Patrick	male	32.0	0	0	370376	7.75	NaN	Q

In [37]:
```
train_data.isnull().sum()
```

Out[37]:
```
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
```

In [38]:
```
train_data.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 [39]:
```
train_data.describe()
```

Out[39]:

	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

Handling the Missing Values in Dataset

In [40]:
```
train_data['Age'] = train_data['Age'].fillna(train_data['Age'].median())

train_data['Embarked'] = train_data['Embarked'].fillna(train_data['Embarked'].mode())

train_data = train_data.drop(columns=['Cabin'])
```

Converting the Data-Types

In [41]:
```
train_data['Survived'] = train_data['Survived'].astype('category')

train_data['Pclass'] = train_data['Pclass'].astype('category')

train_data['Embarked'] = train_data['Embarked'].astype('category')
```

In [42]:
```
train_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
Data columns (total 11 columns):
 #   Column       Non-Null Count  Dtype   
---  ------       --------------  -----   
 0   PassengerId  891 non-null    int64   
 1   Survived     891 non-null    category
 2   Pclass       891 non-null    category
 3   Name         891 non-null    object  
 4   Sex          891 non-null    object  
 5   Age          891 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  Embarked     889 non-null    category
dtypes: category(3), float64(2), int64(3), object(3)
memory usage: 58.8+ KB
```

In [43]:
```
train_data
```

Out[43]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Embarked
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500	S
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2833	C
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9250	S
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1000	S
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	S
...	...	...	...	...	...	...	...	...	...	...	...
886	887	0	2	Montvila, Rev. Juozas	male	27.0	0	0	211536	13.0000	S
887	888	1	1	Graham, Miss. Margaret Edith	female	19.0	0	0	112053	30.0000	S
888	889	0	3	Johnston, Miss. Catherine Helen "Carrie"	female	28.0	1	2	W./C. 6607	23.4500	S
889	890	1	1	Behr, Mr. Karl Howell	male	26.0	0	0	111369	30.0000	C
890	891	0	3	Dooley, Mr. Patrick	male	32.0	0	0	370376	7.7500	Q

891 rows × 11 columns

Performing Exploratory Data Analysis

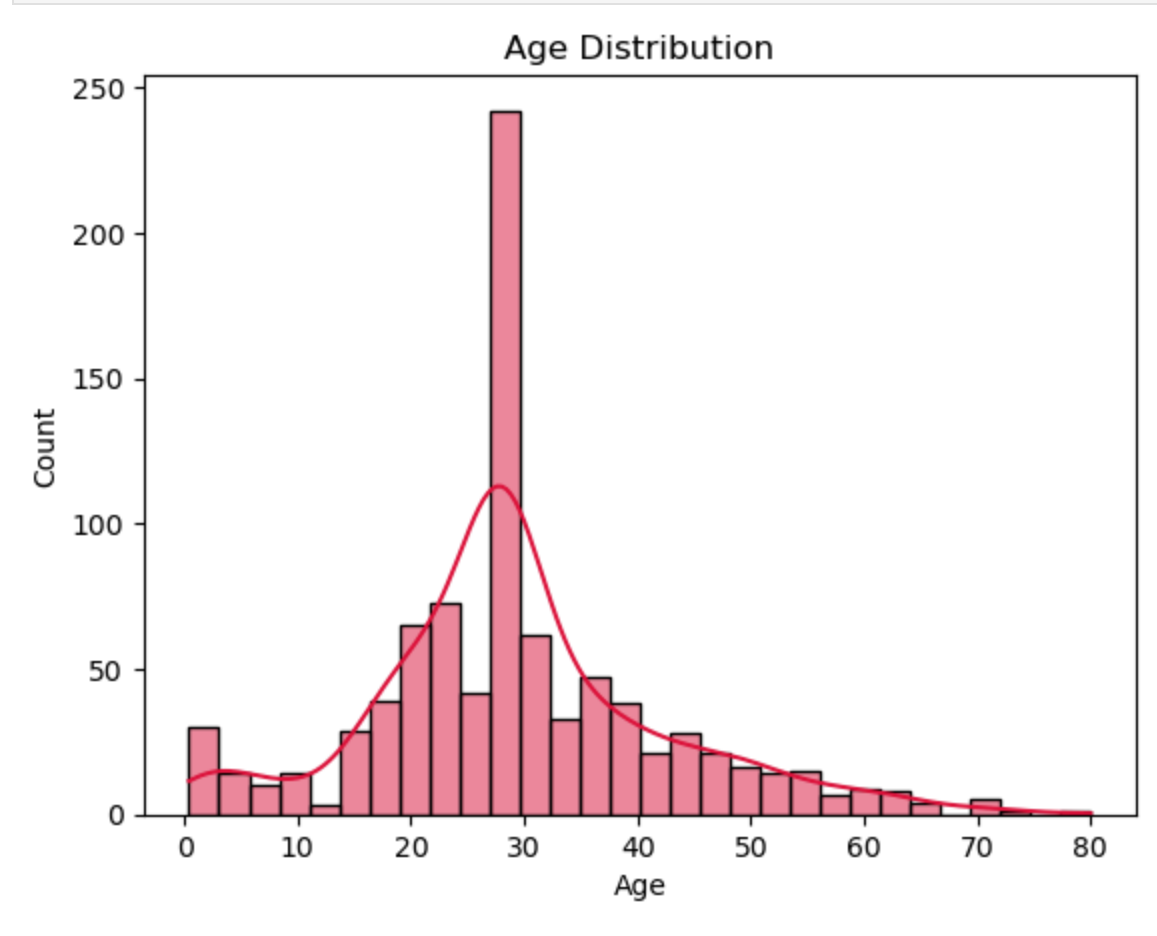
In [44]:
```
train_data.describe()
```

Out[44]:

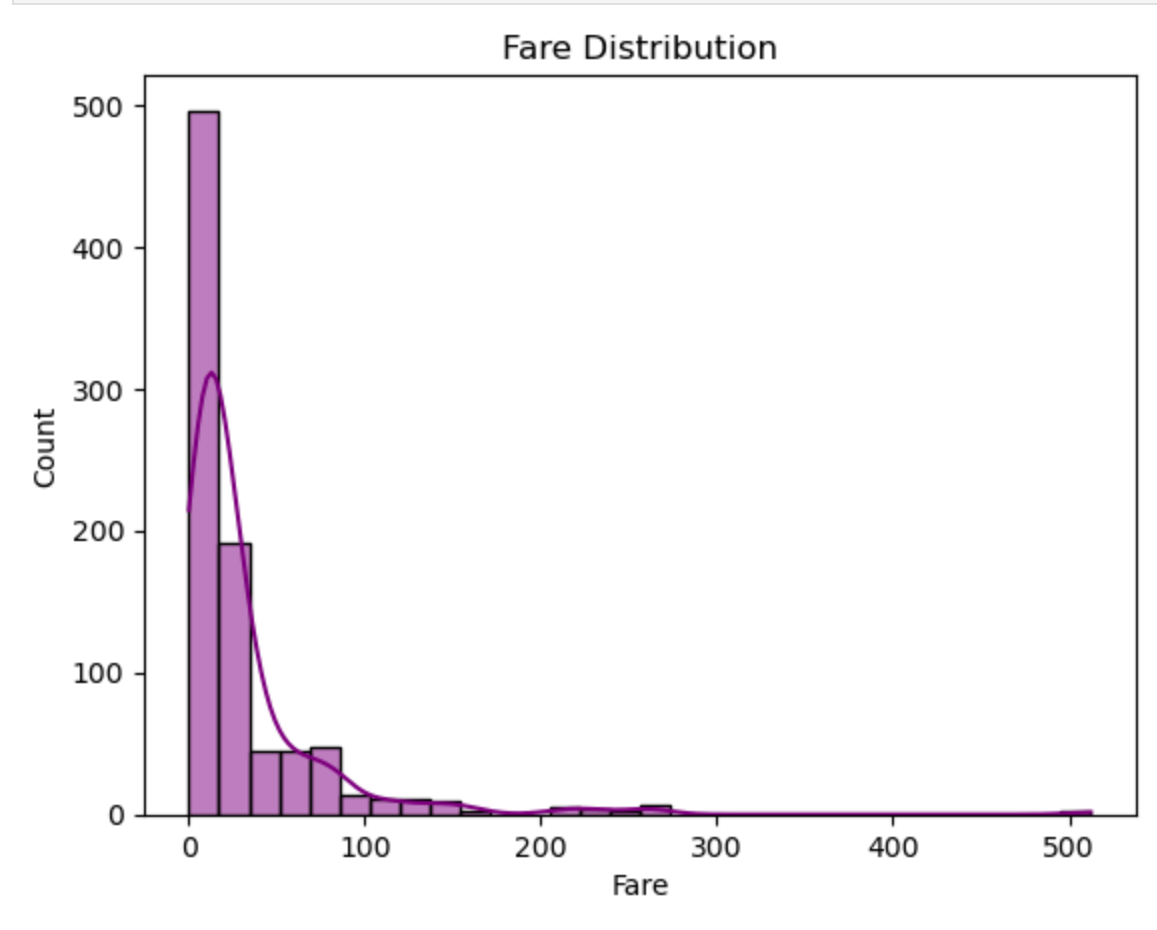
	PassengerId	Age	SibSp	Parch	Fare
count	891.000000	891.000000	891.000000	891.000000	891.000000
mean	446.000000	29.361582	0.523008	0.381594	32.204208
std	257.353842	13.019697	1.102743	0.806057	49.693429
min	1.000000	0.420000	0.000000	0.000000	0.000000
25%	223.500000	22.000000	0.000000	0.000000	7.910400
50%	446.000000	28.000000	0.000000	0.000000	14.454200
75%	668.500000	35.000000	1.000000	0.000000	31.000000
max	891.000000	80.000000	8.000000	6.000000	512.329200

visualizing The Distributions

In [45]:
```
#Age Distribution of passesngers

sns.histplot(train_data['Age'], kde=True, bins=30, color='crimson')
plt.title('Age Distribution')
plt.show()
```

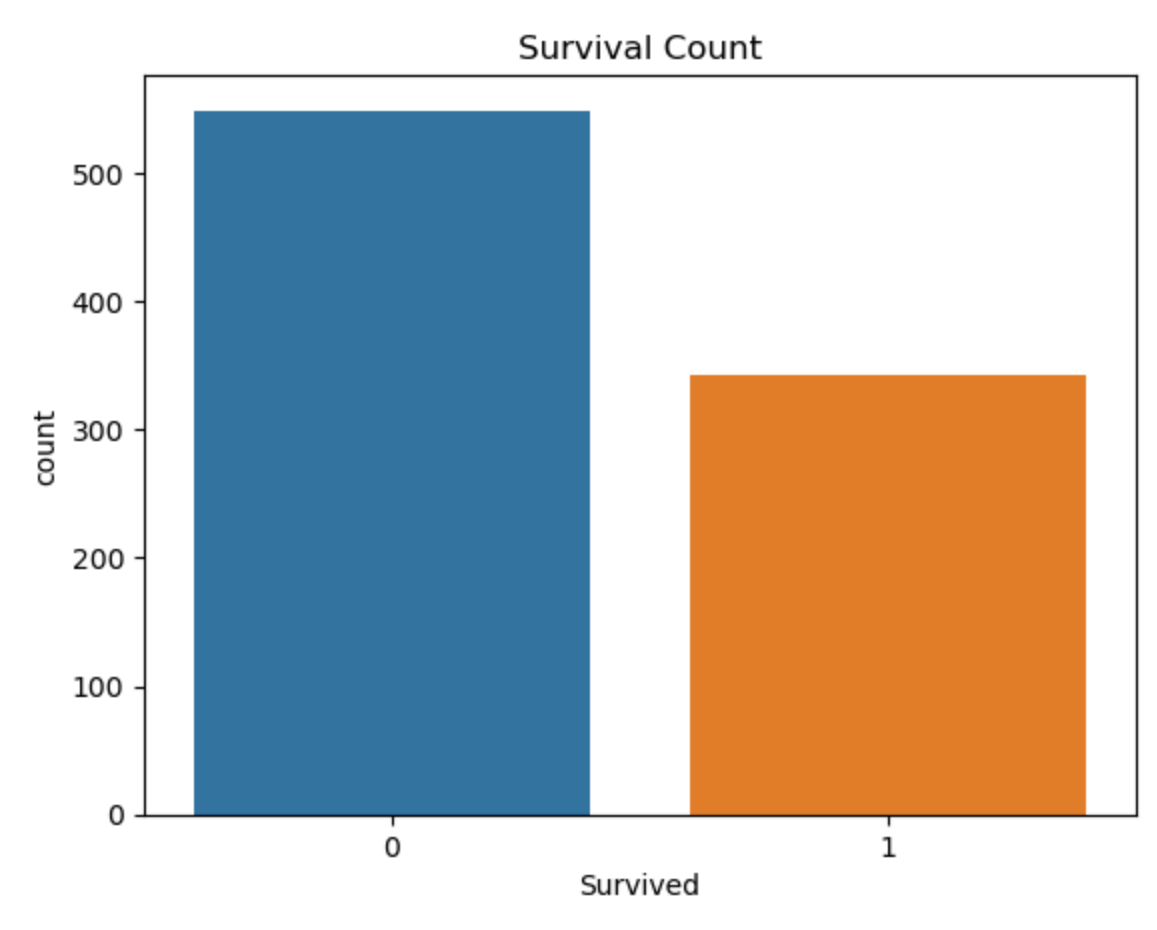


In [46]:
```
#Fare Distribution of passesngers

sns.histplot(train_data['Fare'], kde=True, bins=30, color='purple')
plt.title('Fare Distribution')
plt.show()
```

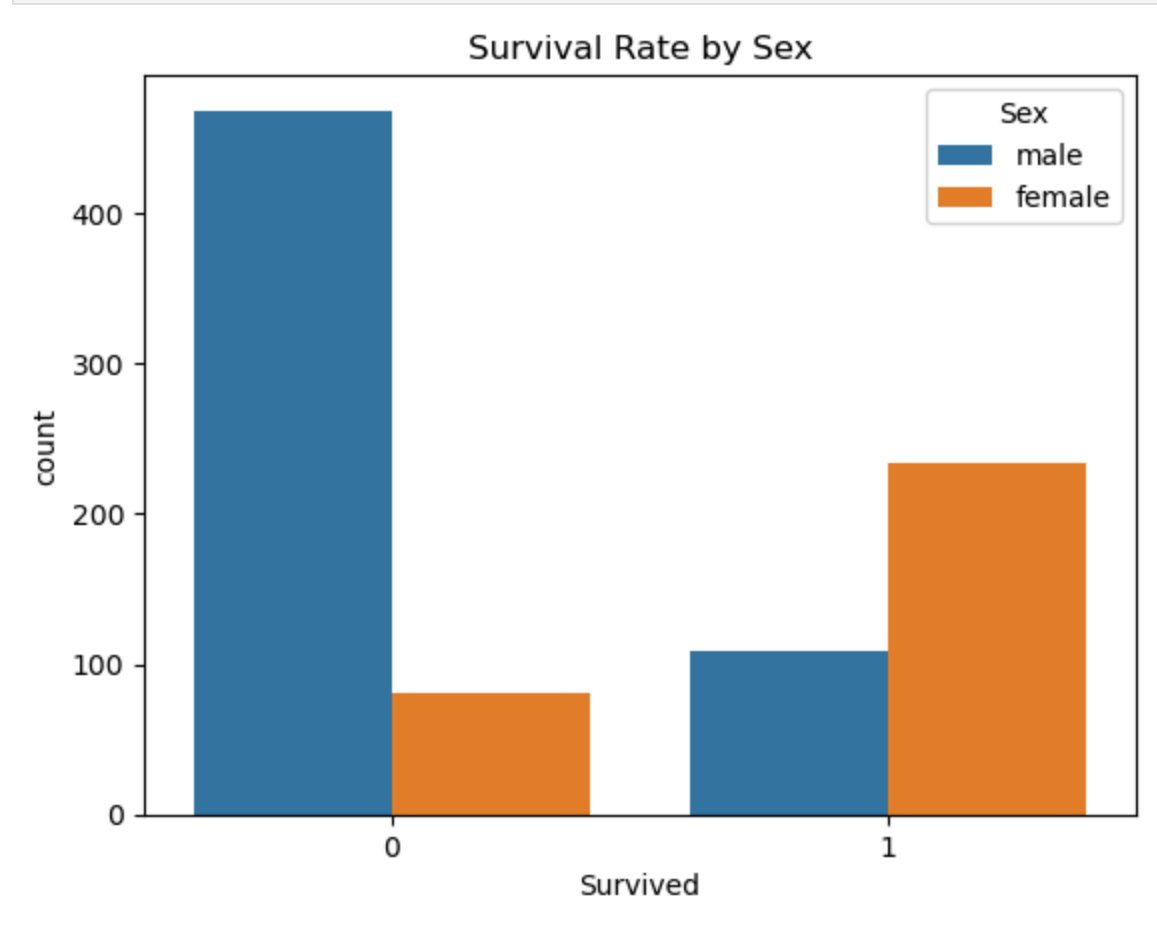


In [71]:
```
# Survival Distribution of passesngers

sns.countplot(x = 'Survived', data=train_data)
plt.title('Survival Count')
```

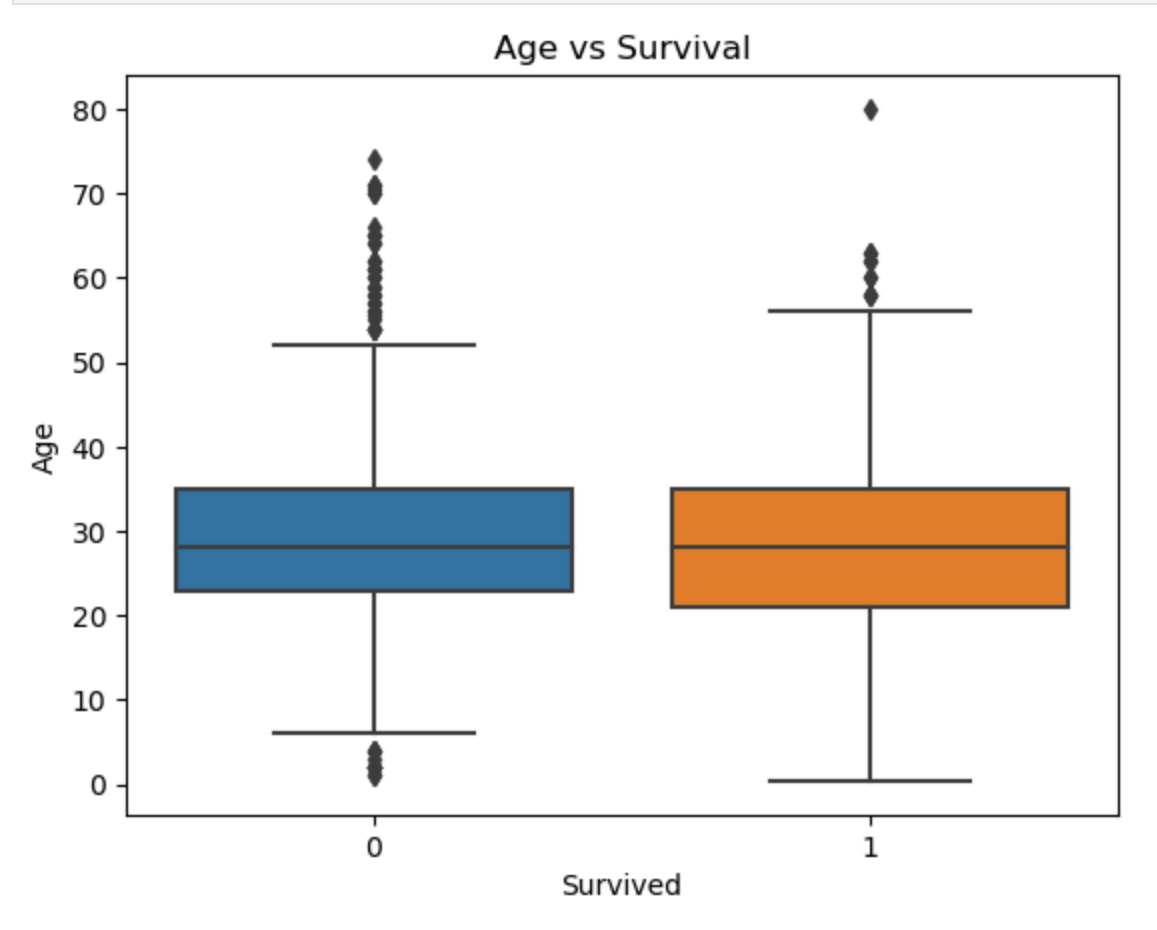
Out[71]:
```
Text(0.5, 1.0, 'Survival Count')
```



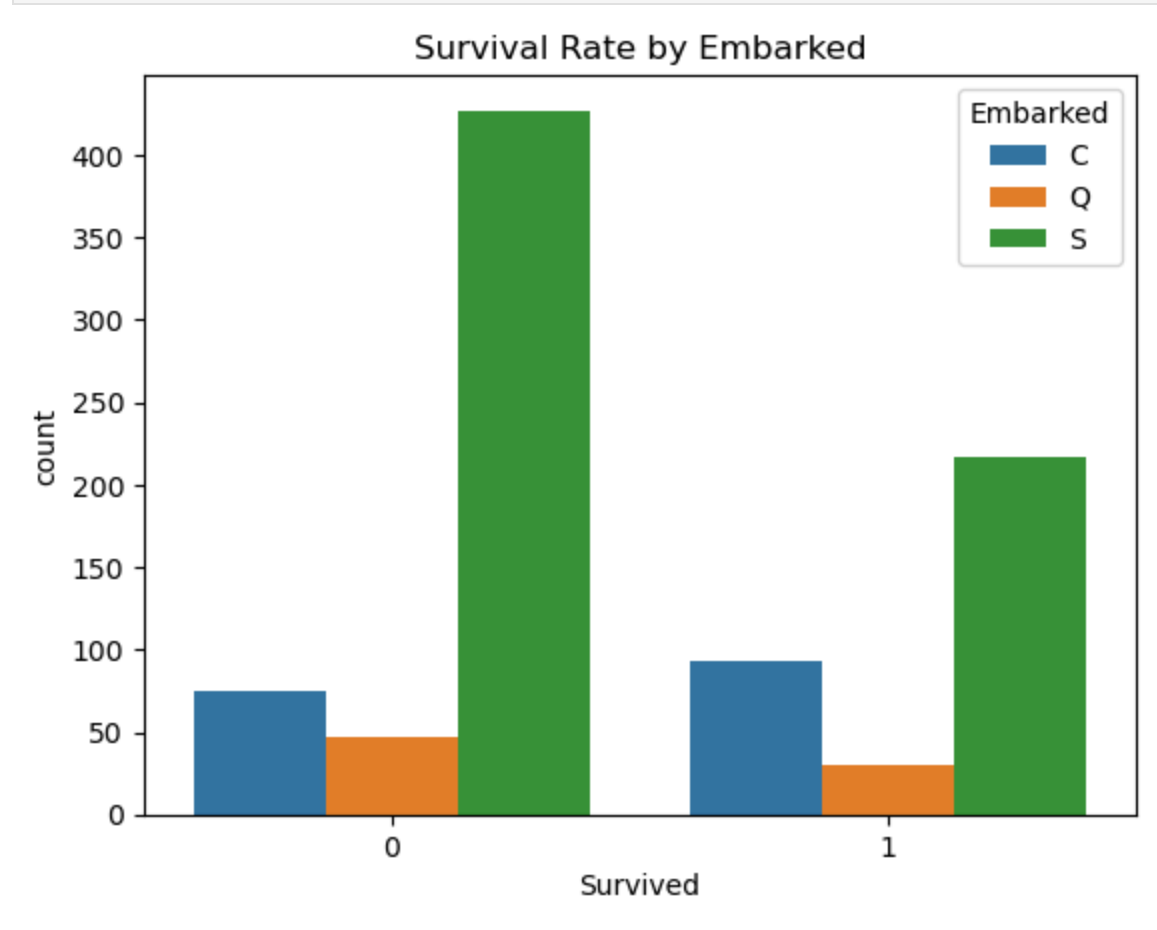
In [48]:
```
# Survival Distribution of passesngers by sex

sns.countplot(x = 'Survived', hue='Sex', data=train_data)
plt.title('Survival Rate by Sex')
plt.show()
```



In [49]:
```
# Survival Distribution of passesngers by age

sns.boxplot(x = 'Survived', y='Age',data=train_data)
plt.title('Age vs Survival')
plt.show()
```



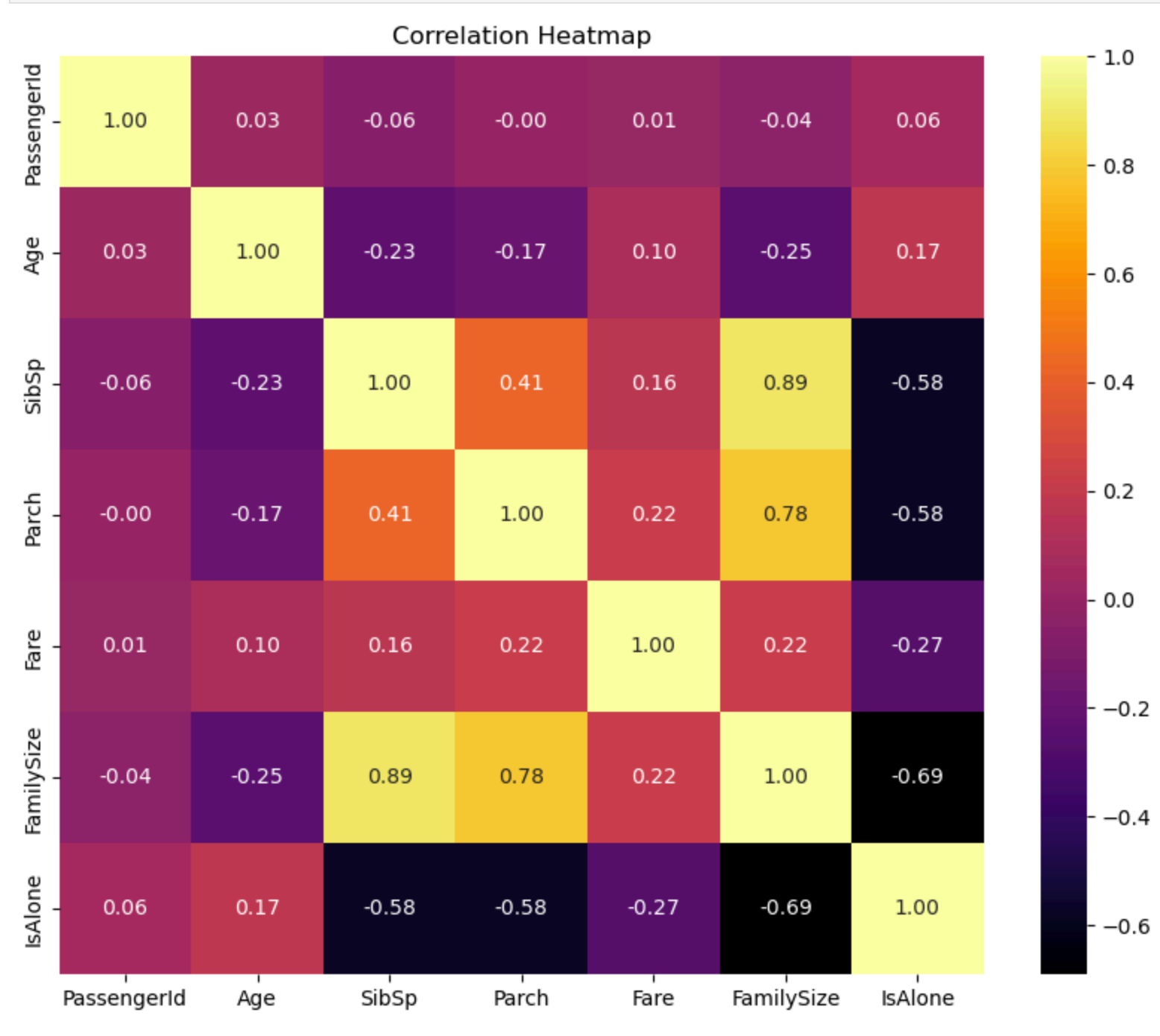
In [50]:
```
# Survival Rate of passesngers by Embarked

sns.countplot(x = 'Survived', hue='Embarked',data=train_data)
plt.title('Survival Rate by Embarked')
plt.show()
```



Feature Engineering and Visualization of Insights

In [51]:
```
train_data['FamilySize'] = train_data['SibSp'] + train_data['Parch'] + 1

train_data.loc[train_data['FamilySize'] > 1, 'IsAlone'] = 0

train_data['IsAlone'] = 1
train_data.loc[train_data['FamilySize'] > 1, 'IsAlone'] = 0
```

In [54]:
```
numeric_data = train_data.select_dtypes(include=['number'])

corr = numeric_data.corr()

plt.figure(figsize=(10,8))
sns.heatmap(corr, annot=True, cmap='inferno', fmt='.2f')
plt.title('Correlation Heatmap')
plt.show()
```



In [55]:
```
x = train_data[['Pclass','Sex', 'Age', 'SibSp','Parch', 'Fare', 'Embarked', 'FamilySize', 'IsAlone']]
x = pd.get_dummies(x, drop_first=True)
y = train_data['Survived']

model = RandomForestClassifier(n_estimators=100)
model.fit(x,y)
```

Out[55]:
```
▾ RandomForestClassifier
RandomForestClassifier()
```

In [56]:
```
feature_importance = pd.DataFrame(model.feature_importances_,index=x.columns, columns=['Importance'])
feature_importance = feature_importance.sort_values('Importance', ascending=False)
print(feature_importance)
```

```
            Importance
Fare          0.267173
Sex_male      0.263569
Age           0.252214
Pclass_3      0.064018
FamilySize    0.045273
SibSp         0.026051
Embarked_S    0.022255
Parch         0.021489
Pclass_2      0.017923
IsAlone       0.011652
Embarked_Q    0.008383
```

In [ ]: