ASSIGNMENT - 3

DATA PREPROCESSING

21BCE9610

sanathkumar.21bce9610@vitapstudent.ac.in

Data preprocessing

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1.Import the Libraries

In [1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

2.Importing the dataset.

In [3]:
```
df=pd.read_csv("C:/Users/rsana/Downloads/Titanic-Dataset.csv")
```

In [4]:
```
df.head()
```

Out[4]:

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

In [5]:
```
df.describe()
```

Out[5]:

	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 [6]:
```
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 [7]:
```
df.corr(numeric_only=True)
```

Out[7]:

	PassengerId	Survived	Pclass	Age	SibSp	Parch	Fare
PassengerId	1.000000	-0.005007	-0.035144	0.036847	-0.057527	-0.001652	0.012658
Survived	-0.005007	1.000000	-0.338481	-0.077221	-0.035322	0.081629	0.257307
Pclass	-0.035144	-0.338481	1.000000	-0.369226	0.083081	0.018443	-0.549500
Age	0.036847	-0.077221	-0.369226	1.000000	-0.308247	-0.189119	0.096067
SibSp	-0.057527	-0.035322	0.083081	-0.308247	1.000000	0.414838	0.159651
Parch	-0.001652	0.081629	0.018443	-0.189119	0.414838	1.000000	0.216225
Fare	0.012658	0.257307	-0.549500	0.096067	0.159651	0.216225	1.000000

In [8]:
```
df.corr(numeric_only=True).Fare.sort_values(ascending=False)
```

Out[8]:
```
Fare           1.000000
Survived       0.257307
Parch          0.216225
SibSp          0.159651
Age            0.096067
PassengerId    0.012658
Pclass        -0.549500
Name: Fare, dtype: float64
```

3.Checking for Null Values

In [9]:
```
df.isnull().any()
```

Out[9]:
```
PassengerId    False
Survived       False
Pclass         False
Name           False
Sex            False
Age             True
SibSp          False
Parch          False
Ticket         False
Fare           False
Cabin           True
Embarked        True
dtype: bool
```

In [10]:
```
df.isnull().sum()
```

Out[10]:
```
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 [11]:
```
df.Sex.nunique()
```

Out[11]:
```
2
```

In [12]:
```
df.Sex.unique()
```

Out[12]:
```
array(['male', 'female'], dtype=object)
```

In [13]:
```
df.Sex.value_counts()
```

Out[13]:
```
Sex
male      577
female    314
Name: count, dtype: int64
```

In [14]:
```
df.Embarked.nunique()
```

Out[14]:
```
3
```

In [15]:
```
df.Embarked.unique()
```

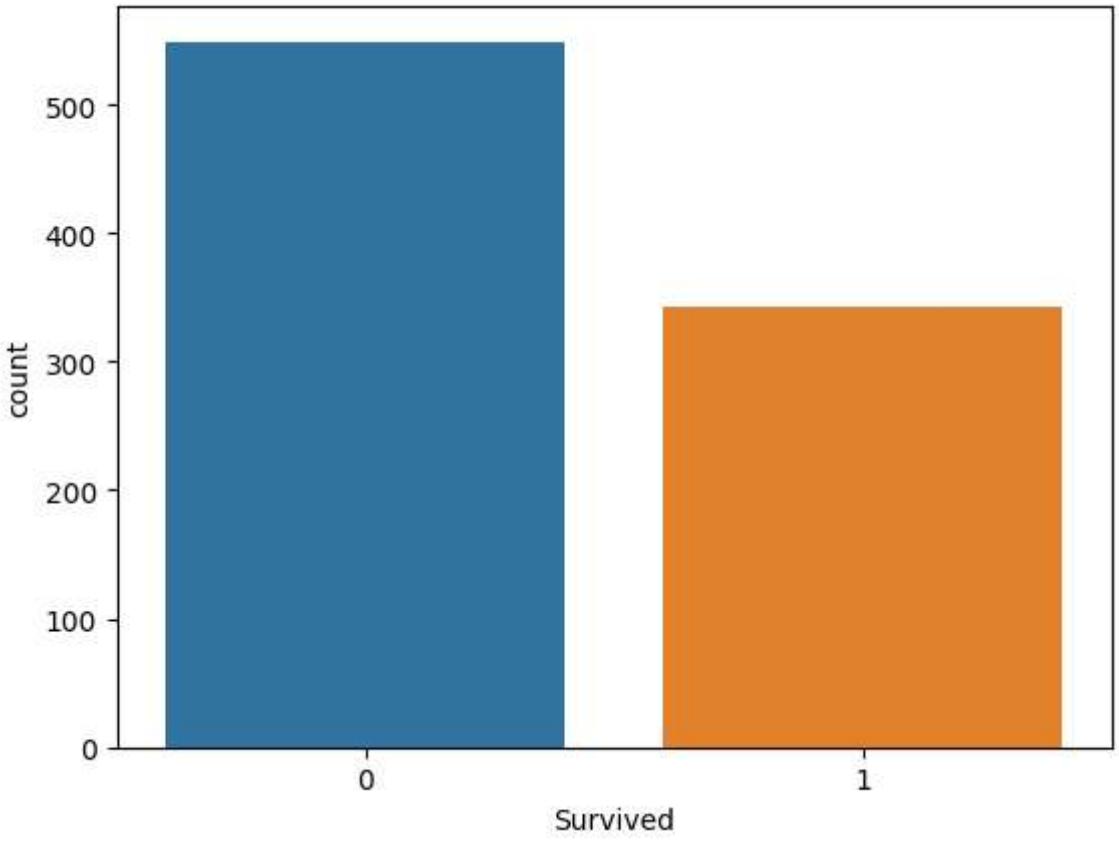
Out[15]:
```
array(['S', 'C', 'Q', nan], dtype=object)
```

In [16]:
```
df.Embarked.value_counts()
```

Out[16]:
```
Embarked
S    644
C    168
Q     77
Name: count, dtype: int64
```

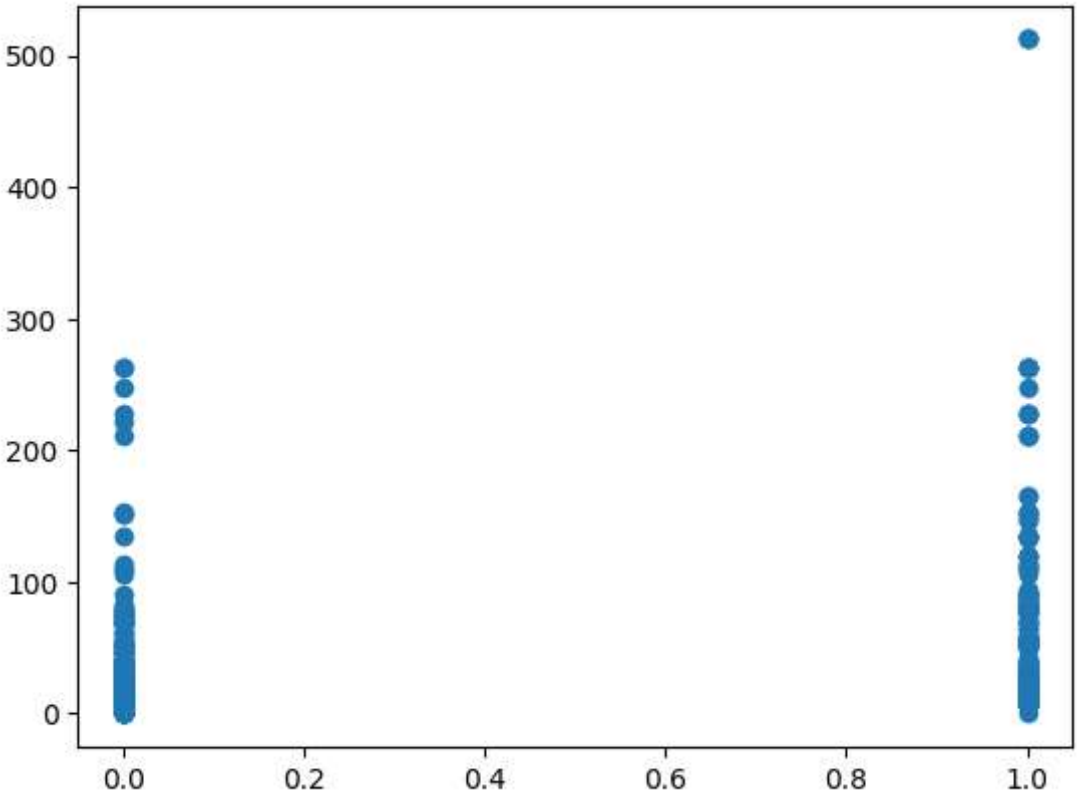
4.Data Visualization

In [17]:
```
sns.countplot(x='Survived', data=df)
plt.show()
```



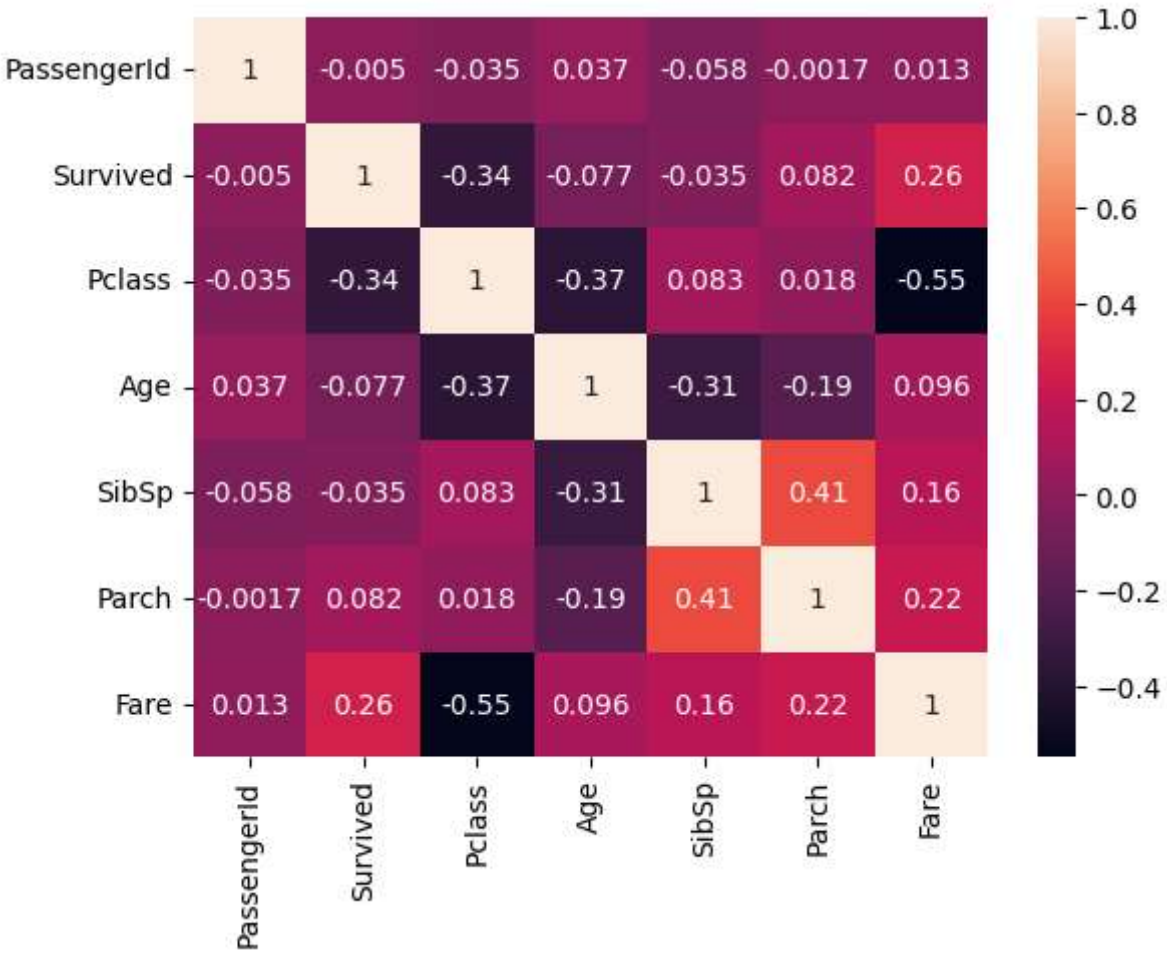
In [18]:
```
plt.scatter(df["Survived"],df["Fare"])
```

Out[18]:
```
<matplotlib.collections.PathCollection at 0x1f89ae19b40>
```



In [19]:
```
sns.heatmap(df.corr(numeric_only=True),annot=True)
```

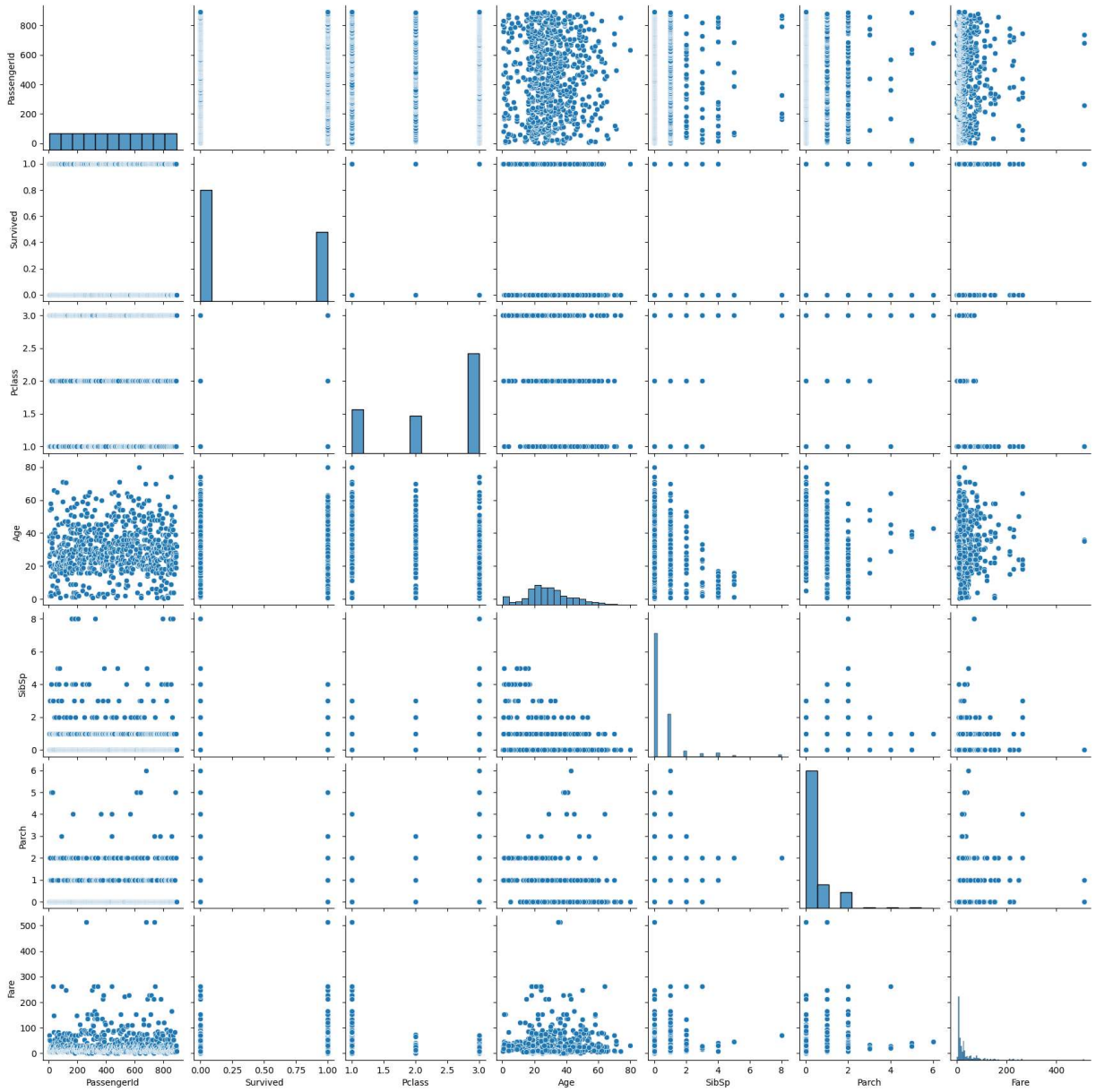
Out[19]: <Axes: >



In [20]:
```
import warnings
# Ignore the specified warnings globally
warnings.filterwarnings("ignore", category=FutureWarning)
warnings.filterwarnings("ignore", category=UserWarning)
```

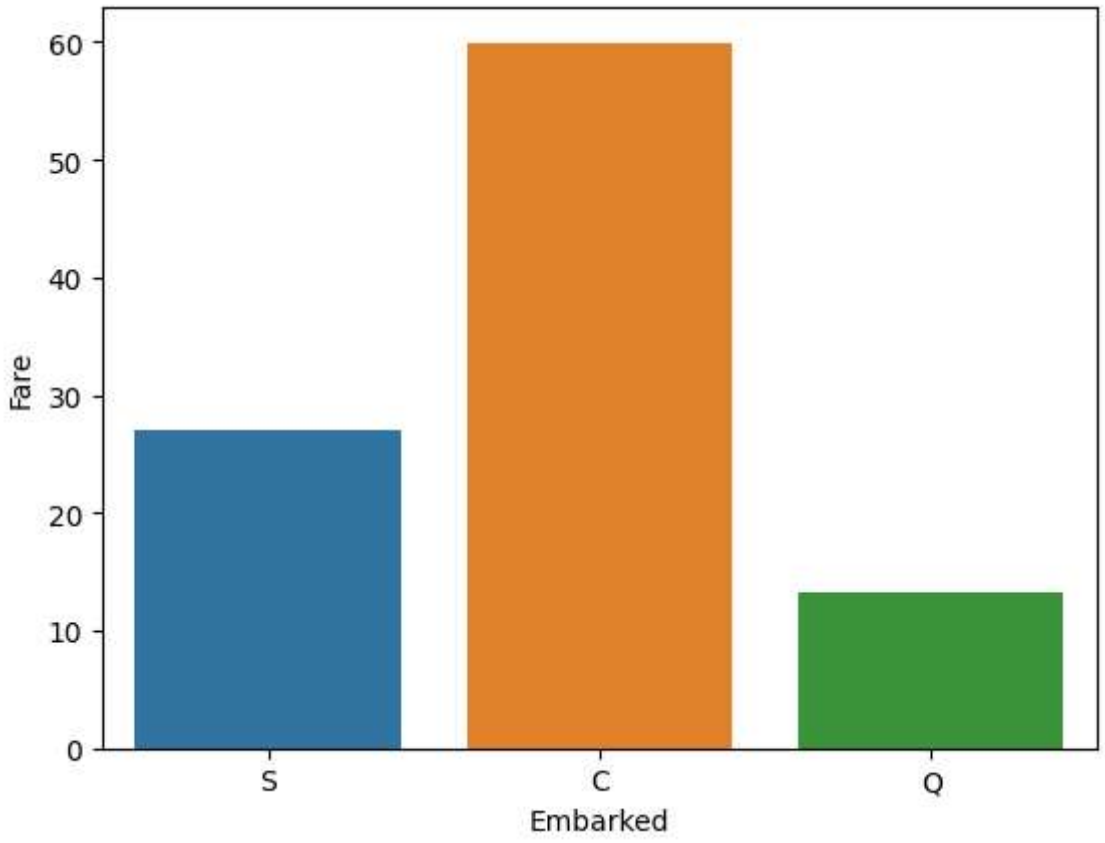
In [21]:
```
sns.pairplot(df)
```

Out[21]:
```
<seaborn.axisgrid.PairGrid at 0x1f89aa7c730>
```



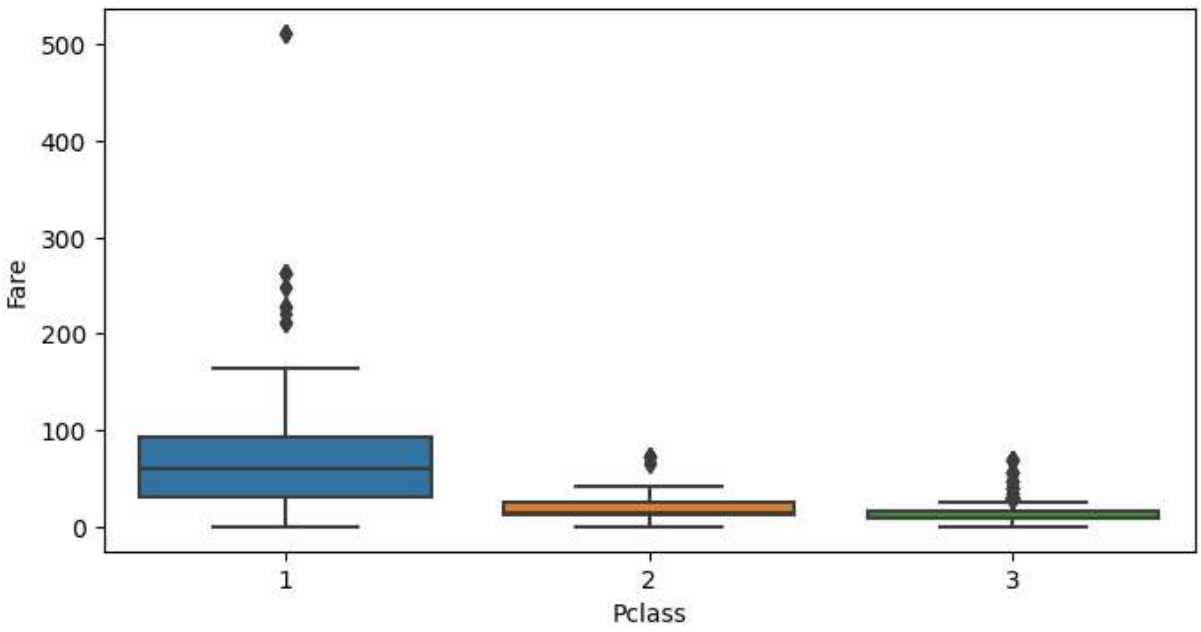
In [22]:
```
sns.barplot(x=df["Embarked"],y=df["Fare"],ci=0)
```

Out[22]:
```
<Axes: xlabel='Embarked', ylabel='Fare'>
```



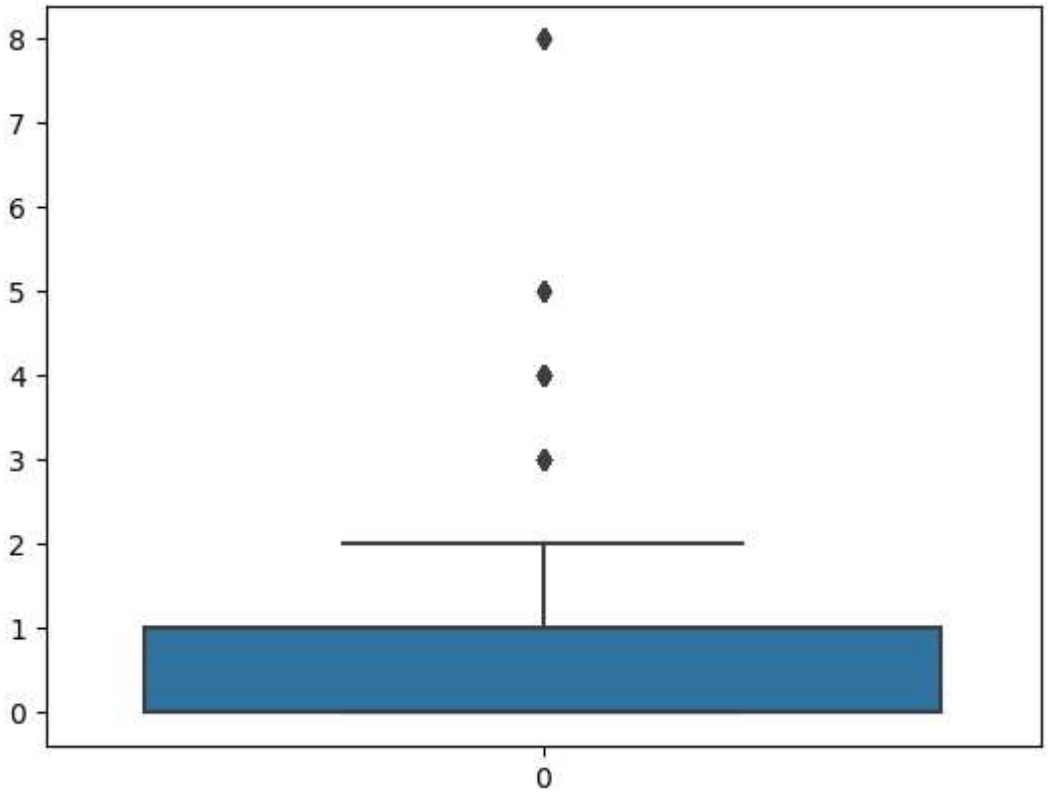
5.Outlier Detection

In [23]:
```
plt.figure(figsize=(8, 4))
sns.boxplot(x='Pclass', y='Fare', data=df)
plt.show()
```



In [24]:
```
sns.boxplot(df["SibSp"])
```

Out[24]: <Axes: >



6.Splitting Dependent and independent Variables

In [25]:
```
df.head()
```

Out[25]:

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

In [26]:
```
non_numeric_cols = ['Name', 'Ticket', 'Cabin']
# Extract numerical columns by excluding non-numeric columns
numeric_cols = [col for col in df.columns if col not in non_numeric_cols]
df = df[numeric_cols]
```

In [27]:
```
df.head()
```

Out[27]:

	PassengerId	Survived	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked
0	1	0	3	male	22.0	1	0	7.2500	S
1	2	1	1	female	38.0	1	0	71.2833	C
2	3	1	3	female	26.0	0	0	7.9250	S
3	4	1	1	female	35.0	1	0	53.1000	S
4	5	0	3	male	35.0	0	0	8.0500	S

In [28]:
```
#indenpendent variables hould be 2 d array or dataframe
X=df.drop(columns=["Survived"],axis=1)
X.head()
```

Out[28]:

	PassengerId	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked
0	1	3	male	22.0	1	0	7.2500	S
1	2	1	female	38.0	1	0	71.2833	C
2	3	3	female	26.0	0	0	7.9250	S
3	4	1	female	35.0	1	0	53.1000	S
4	5	3	male	35.0	0	0	8.0500	S

In [29]:
```
X.shape
```

Out[29]:
```
(891, 8)
```

In [30]:
```
type(X)
```

Out[30]:
```
pandas.core.frame.DataFrame
```

In [31]:
```
y=df["Survived"]
y.head()
```

Out[31]:
```
0    0
1    1
2    1
3    1
4    0
Name: Survived, dtype: int64
```

7.Encoding

In [32]:
```
X.head()
```

Out[32]:

	PassengerId	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked
0	1	3	male	22.0	1	0	7.2500	S
1	2	1	female	38.0	1	0	71.2833	C
2	3	3	female	26.0	0	0	7.9250	S
3	4	1	female	35.0	1	0	53.1000	S
4	5	3	male	35.0	0	0	8.0500	S

In [33]:
```
from sklearn.preprocessing import LabelEncoder
le=LabelEncoder()
```

In [34]:
```
X["Sex"]=le.fit_transform(X["Sex"])
```

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

Out[35]:

	PassengerId	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked
0	1	3	1	22.0	1	0	7.2500	S
1	2	1	0	38.0	1	0	71.2833	C
2	3	3	0	26.0	0	0	7.9250	S
3	4	1	0	35.0	1	0	53.1000	S
4	5	3	1	35.0	0	0	8.0500	S

In [36]:
```
print(le.classes_)
```

```
['female' 'male']
```

In [37]:
```
mapping=dict(zip(le.classes_,range(len(le.classes_))))
mapping
```

Out[37]:
```
{'female': 0, 'male': 1}
```

In [38]:
```
X["Embarked"]=le.fit_transform(X["Embarked"])
```

In [39]:
```
X.head()
```

Out[39]:

	PassengerId	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked
0	1	3	1	22.0	1	0	7.2500	2
1	2	1	0	38.0	1	0	71.2833	0
2	3	3	0	26.0	0	0	7.9250	2
3	4	1	0	35.0	1	0	53.1000	2
4	5	3	1	35.0	0	0	8.0500	2

In [40]:
```
print(le.classes_)
```

```
['C' 'Q' 'S' nan]
```

In [41]:
```
mapping=dict(zip(le.classes_,range(len(le.classes_))))
mapping
```

Out[41]:
```
{'C': 0, 'Q': 1, 'S': 2, nan: 3}
```

8.Feature Scaling

In [42]:
```
from sklearn.preprocessing import MinMaxScaler
ms=MinMaxScaler()
```

In [43]:
```
X_scaled = ms.fit_transform(X)
```

In [44]:
```
X_Scaled=pd.DataFrame(ms.fit_transform(X),columns=X.columns)
```

In [45]:
```
X_Scaled.head()
```

Out[45]:

	PassengerId	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked
0	0.000000	1.0	1.0	0.271174	0.125	0.0	0.014151	0.666667
1	0.001124	0.0	0.0	0.472229	0.125	0.0	0.139136	0.000000
2	0.002247	1.0	0.0	0.321438	0.000	0.0	0.015469	0.666667
3	0.003371	0.0	0.0	0.434531	0.125	0.0	0.103644	0.666667
4	0.004494	1.0	1.0	0.434531	0.000	0.0	0.015713	0.666667

In [46]:
```
# Splitting Data into Train and Test
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X_Scaled, y, test_size=0.2, ran
# Displaying the preprocessed data
print(X_train.head())
print(X_test.head())
print(y_train.head())
print(y_test.head())
```

```
     PassengerId  Pclass  Sex       Age  SibSp     Parch      Fare  Embarked
331     0.371910     0.0  1.0  0.566474  0.000  0.000000  0.055628  0.666667
733     0.823596     0.5  1.0  0.283740  0.000  0.000000  0.025374  0.666667
382     0.429213     1.0  1.0  0.396833  0.000  0.000000  0.015469  0.666667
704     0.791011     1.0  1.0  0.321438  0.125  0.000000  0.015330  0.666667
813     0.913483     1.0  0.0  0.070118  0.500  0.333333  0.061045  0.666667
     PassengerId  Pclass  Sex       Age  SibSp     Parch      Fare  Embarked
709     0.796629     1.0  1.0       NaN  0.125  0.166667  0.029758  0.000000
439     0.493258     0.5  1.0  0.384267  0.000  0.000000  0.020495  0.666667
840     0.943820     1.0  1.0  0.246042  0.000  0.000000  0.015469  0.666667
720     0.808989     0.5  0.0  0.070118  0.000  0.166667  0.064412  0.666667
39      0.043820     1.0  0.0  0.170646  0.125  0.000000  0.021942  0.000000
331    0
733    0
382    0
704    0
813    0
Name: Survived, dtype: int64
709    1
439    0
840    0
720    1
39     1
Name: Survived, dtype: int64
```

In [47]:
```
print(X_train.shape,X_test.shape,y_train.shape,y_test.shape)
```

```
(712, 8) (179, 8) (712,) (179,)
```

In [ ]:
```

```