In [ ]:

```
# This notebook predicts if a passenger will survive

# Referred to randerson112358's notebook
```

In [136]:

```
#Import Libraries
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
import warnings
warnings.filterwarnings('ignore')
```

In [111]:

```
#Load the data
titanic = sns.load_dataset('titanic')
#Print the first 10 rows of data
titanic.head(10)
```

Out[111]:

	survived	pclass	sex	age	sibsp	parch	fare	embarked	class	who	adult_mal
0	0	3	male	22.0	1	0	7.2500	S	Third	man	Tru
1	1	1	female	38.0	1	0	71.2833	C	First	woman	Fals
2	1	3	female	26.0	0	0	7.9250	S	Third	woman	Fals
3	1	1	female	35.0	1	0	53.1000	S	First	woman	Fals
4	0	3	male	35.0	0	0	8.0500	S	Third	man	Tru
5	0	3	male	NaN	0	0	8.4583	Q	Third	man	Tru
6	0	1	male	54.0	0	0	51.8625	S	First	man	Tru
7	0	3	male	2.0	3	1	21.0750	S	Third	child	Fals
8	1	3	female	27.0	0	2	11.1333	S	Third	woman	Fals
9	1	2	female	14.0	1	0	30.0708	C	Second	child	Fals

In [112]:

```
#Count the number of rows and columns in the data set
titanic.shape
```

Out[112]:

```
(891, 15)
```

In [113]:

```
titanic.describe()
```

Out[113]:

	survived	pclass	age	sibsp	parch	fare
count	891.000000	891.000000	714.000000	891.000000	891.000000	891.000000
mean	0.383838	2.308642	29.699118	0.523008	0.381594	32.204208
std	0.486592	0.836071	14.526497	1.102743	0.806057	49.693429
min	0.000000	1.000000	0.420000	0.000000	0.000000	0.000000
25%	0.000000	2.000000	20.125000	0.000000	0.000000	7.910400
50%	0.000000	3.000000	28.000000	0.000000	0.000000	14.454200
75%	1.000000	3.000000	38.000000	1.000000	0.000000	31.000000
max	1.000000	3.000000	80.000000	8.000000	6.000000	512.329200

In [169]:

```
#Get a count of the number of survivors
titanic['survived'].value_counts()
```

Out[169]:

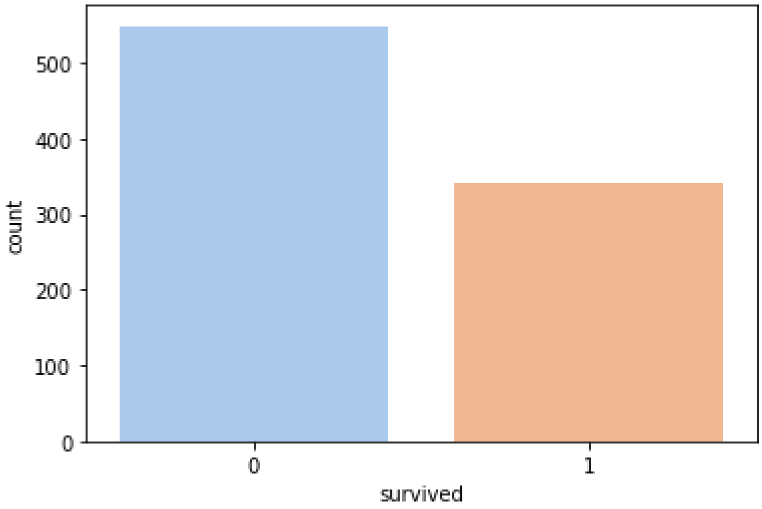
```
0    549
1    342
Name: survived, dtype: int64
```

In [170]:

```
#Visualizing the count of number of survivors
sns.countplot(titanic['survived'], label="Count")
```

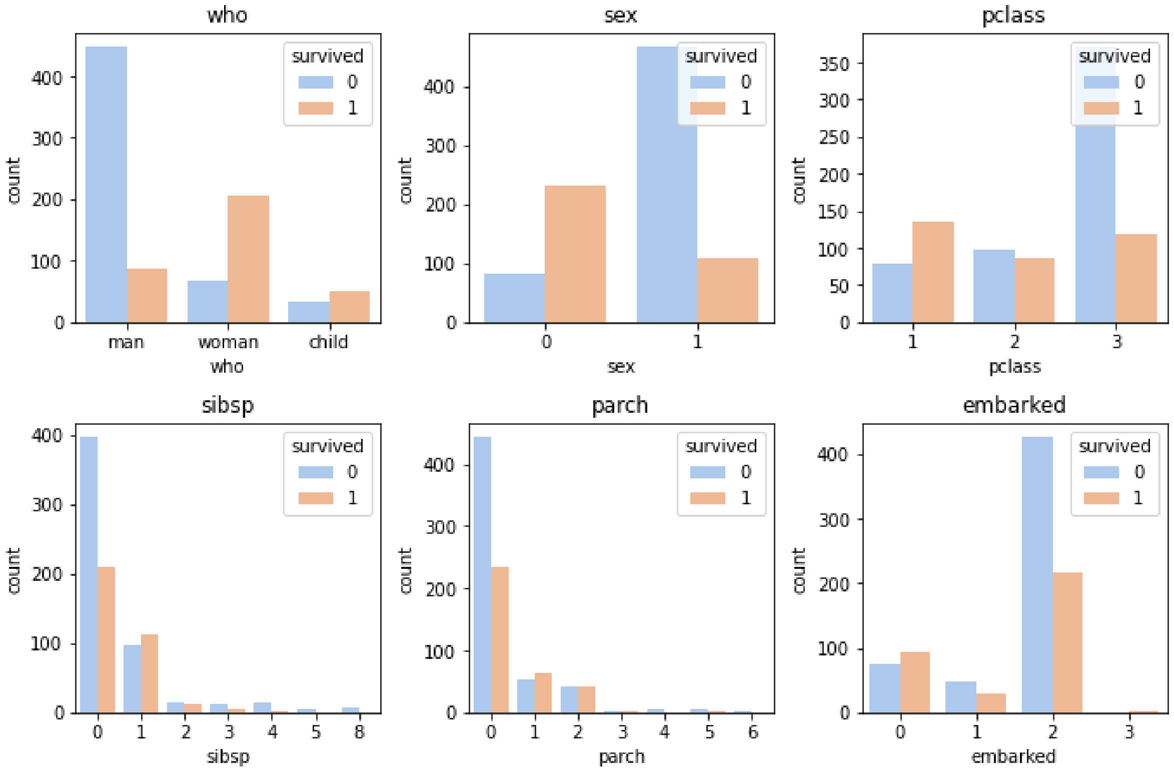
Out[170]:

```
<AxesSubplot:xlabel='survived', ylabel='count'>
```



In [167]:

```
# Visualize the count of survivors for columns 'who', 'sex', 'pclass', 'sibsp', 'parch', an
cols = ['who', 'sex', 'pclass', 'sibsp', 'parch', 'embarked']

n_rows = 2
n_cols = 3

# The subplot grid and the figure size of each graph
# This returns a Figure (fig) and an Axes Object (axs)
fig, axs = plt.subplots(n_rows, n_cols, figsize=(n_cols*3.2,n_rows*3.2))

for r in range(0,n_rows):
    for c in range(0,n_cols):

        i = r*n_cols+ c #index to go through the number of columns
        ax = axs[r][c] #Show where to position each subplot
        sns.countplot(titanic[cols[i]], hue=titanic["survived"], ax=ax)
        ax.set_title(cols[i])
        ax.legend(title="survived", loc='upper right')

plt.tight_layout()   #tight_layout
```



In [90]:

```
#Look at survival rate by sex
titanic.groupby('sex')[['survived']].mean()
```

Out[90]:

	survived
sex	
female	0.742038
male	0.188908

In [91]:

```
#Look at survival rate by sex and class
titanic.pivot_table('survived', index='sex', columns='class')
```

Out[91]:

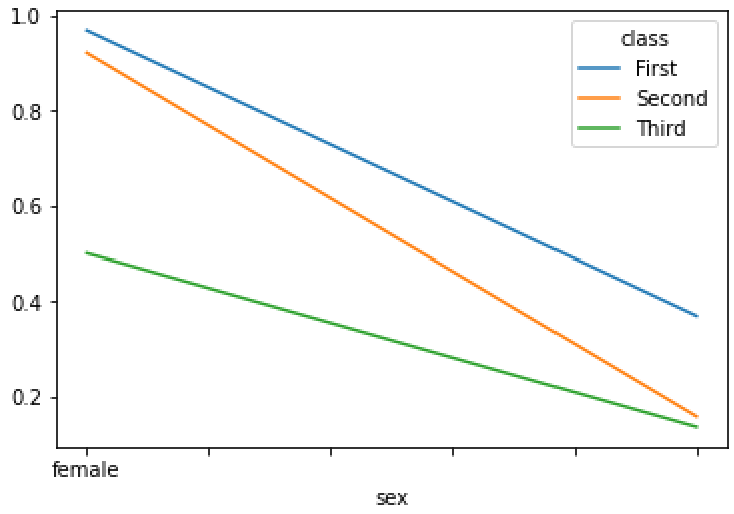
class	First	Second	Third
sex			
female	0.968085	0.921053	0.500000
male	0.368852	0.157407	0.135447

In [93]:

```
#Look at survival rate by sex and class visually
titanic.pivot_table('survived', index='sex', columns='class').plot()
```

Out[93]:

```
<AxesSubplot:xlabel='sex'>
```

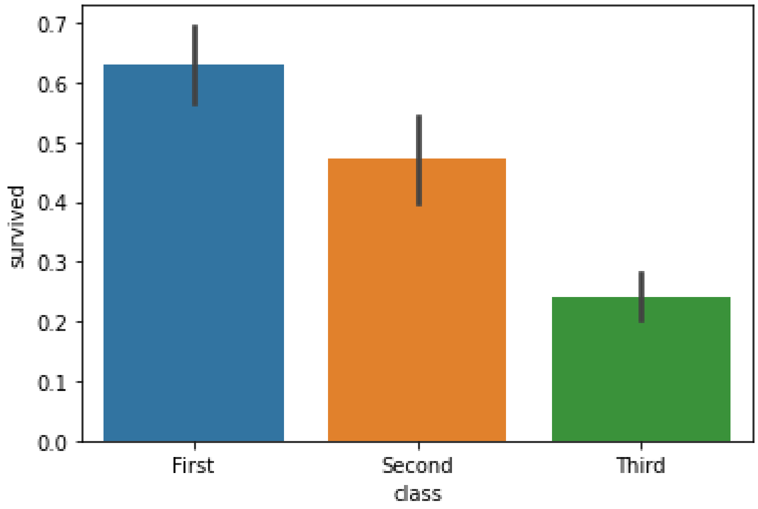


In [92]:

```
#Plot the survival rate of each class.
sns.barplot(x='class', y='survived', data=titanic)
```

Out[92]:

```
<AxesSubplot:xlabel='class', ylabel='survived'>
```



In [94]:

```
#Look at survival rate by sex, age and class
age = pd.cut(titanic['age'], [0, 18, 80])
titanic.pivot_table('survived', ['sex', age], 'class')
```

Out[94]:

	class	First	Second	Third
sex	age			
female	(0, 18]	0.909091	1.000000	0.511628
	(18, 80]	0.972973	0.900000	0.423729
male	(0, 18]	0.800000	0.600000	0.215686
	(18, 80]	0.375000	0.071429	0.133663

In [ ]:

```
plt.figure(figsize=(6,2))
sns.catplot(data=df_train,x='Pclass',y='Age',kind='box',col='Sex',row='Survived', palette="
```

In [101]:

```
#Count the empty (NaN, NAN, na) values in each column
titanic.isna().sum()
```

Out[101]:

```
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
```

In [102]:

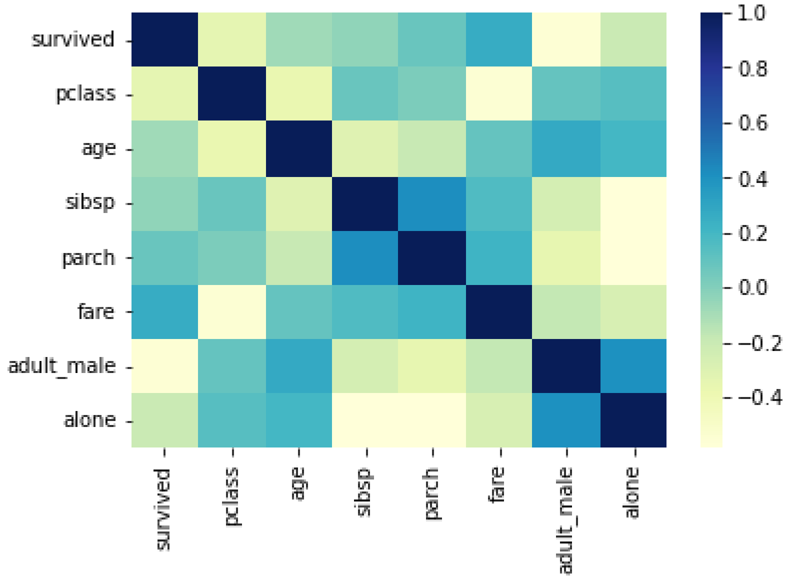
```
#Look at all of the values in each column & get a count
for val in titanic:
   print(titanic[val].value_counts())
   print()
```

```
0    549
1    342
Name: survived, dtype: int64

3    491
1    216
2    184
Name: pclass, dtype: int64

male      577
female    314
Name: sex, dtype: int64

24.00    30
22.00    27
18.00    26
19.00    25
28.00    25
         ..
36.50     1
55.50     1
0.92      1
23.50     1
74.00     1
Name: age, Length: 88, dtype: int64

0    608
1    209
2     28
4     18
3     16
8      7
5      5
Name: sibsp, dtype: int64

0    678
1    118
2     80
5      5
3      5
4      4
6      1
Name: parch, dtype: int64

8.0500     43
13.0000    42
7.8958     38
7.7500     34
26.0000    31
           ..
35.0000     1
28.5000     1
6.2375      1
14.0000     1
```

```
10.5167     1
Name: fare, Length: 248, dtype: int64

S    644
C    168
Q     77
Name: embarked, dtype: int64

Third     491
First     216
Second    184
Name: class, dtype: int64

man      537
woman    271
child     83
Name: who, dtype: int64

True     537
False    354
Name: adult_male, dtype: int64

C    59
B    47
D    33
E    32
A    15
F    13
G     4
Name: deck, dtype: int64

Southampton    644
Cherbourg      168
Queenstown      77
Name: embark_town, dtype: int64

no     549
yes    342
Name: alive, dtype: int64

True     537
False    354
Name: alone, dtype: int64
```

In [116]:

```
import seaborn as sns

sns.heatmap(titanic.corr(), cmap="YlGnBu")
plt.show()
```



In [8]:

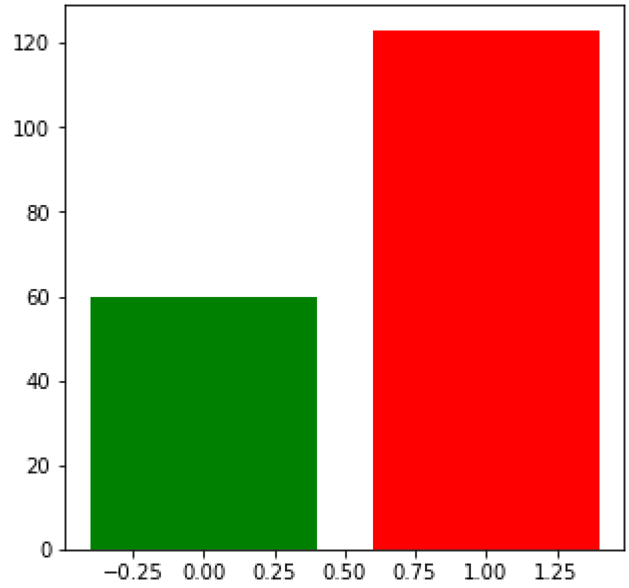
```
Titanic_train['Survived'].value_counts()
```

Out[8]:

```
0    549
1    342
Name: Survived, dtype: int64
```

In [81]:

```
#Vitualisation of the Survived
plt.figure(figsize=(5,5))
plt.bar(list(Titanic_train['Survived']. value_counts().keys()),list(Titanic_train['Survived
plt.show()
```



In [11]:

```
Titanic_train['Pclass'].value_counts()
```

Out[11]:

```
3    491
1    216
2    184
Name: Pclass, dtype: int64
```

In [11]:

```
plt.figure(figsize=(5,5))
plt.bar(list(Titanic_train['Pclass'].value_counts().keys()),list(Titanic_train['Pclass'].va
plt.show()
```

...

In [138]:

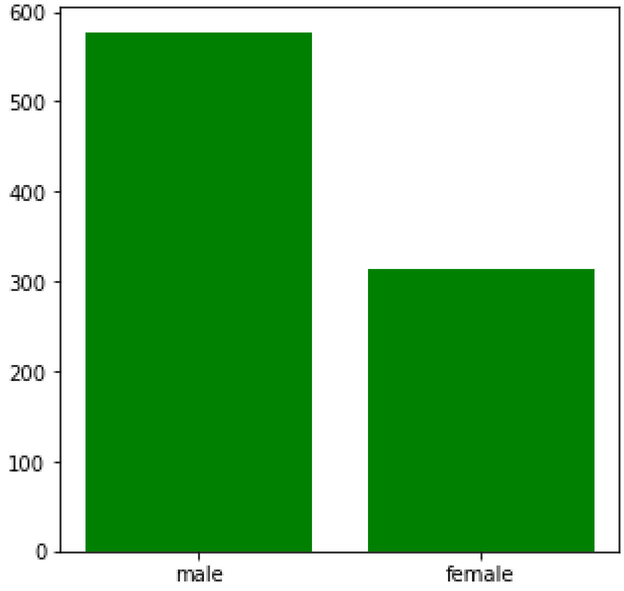
```
Titanic_train ['Sex'].value_counts
```

Out[138]:

```
<bound method IndexOpsMixin.value_counts of 1      female
3      female
6        male
10     female
11     female
        ...
871    female
872      male
879    female
887    female
889      male
Name: Sex, Length: 183, dtype: object>
```

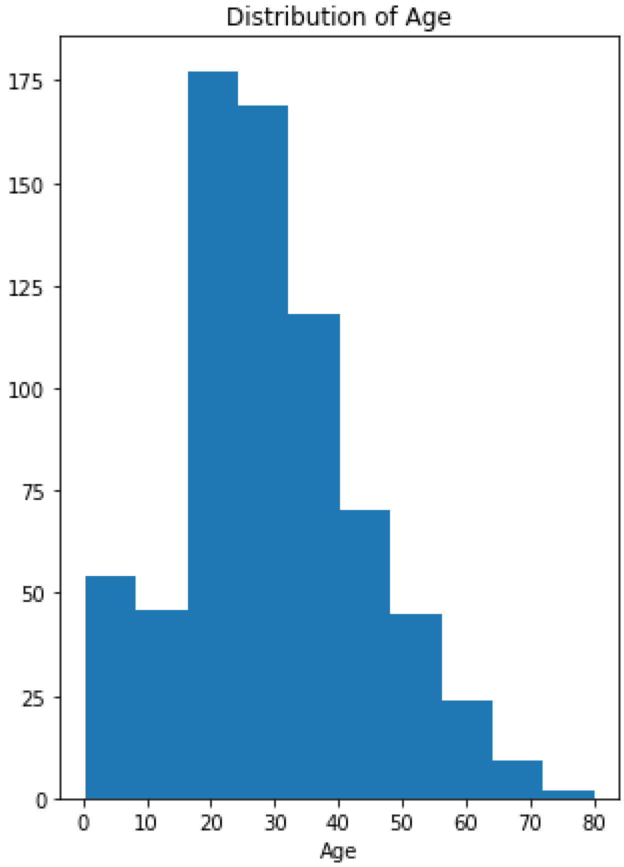
In [13]:

```
plt.figure(figsize=(5,5))
plt.bar(list(Titanic_train['Sex'].value_counts().keys()),list(Titanic_train['Sex'].value_co
plt.show()
```



In [16]:

```
plt.figure(figsize=(5,7))
plt.hist(Titanic_train['Age'])
plt.title("Distribution of Age")
plt.xlabel("Age")
plt.show()
```



In [18]:

```
sum(Titanic_train['Survived'].isnull())
```

Out[18]:

```
0
```

In [21]:

```
sum(Titanic_train['Age'].isnull())
```

Out[21]:

```
0
```

In [20]:

```
Titanic_train=Titanic_train.dropna()
```

In [ ]:

```
#building  model
```

In [24]:

```
sum(Titanic_train['Survived'].isnull())
```

Out[24]:

```
0
```

In [22]:

```
sum(Titanic_train['Age'].isnull())
```

Out[22]:

```
0
```

In [ ]:

```
x_train=Titanic_train['Age']
y_train=Titanic_train['Survived']

```

In [32]:

```
from sklearn.tree import DecisionTreeClassifier
```

In [33]:

```
dtc = DecisionTreeClassifier()
```

In [ ]:

```
#predicting values
```

In [117]:

```
sum(Titanic_test['Age'].isnull())
```

Out[117]:

```
0
```

In [36]:

```
Titanic_test=Titanic_test.dropna()
```

In [37]:

```
sum(Titanic_test['Age'].isnull())
```

Out[37]:

```
0
```

In [118]:

```
Titanic_train.dtypes
```

Out[118]:

```
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 [141]:

```
Titanic_train['Name'].map(lambda row: row.split(',')[1].split('.')[0])
```

Out[141]:

```
1         Mrs
3         Mrs
6          Mr
10       Miss
11       Miss
       ...  
871       Mrs
872        Mr
879       Mrs
887      Miss
889        Mr
Name: Name, Length: 183, dtype: object
```

In [142]:

```
Titanic_train['Name'].map(lambda row: row.split(',')[1].split('.')[0]).value_counts()
```

Out[142]:

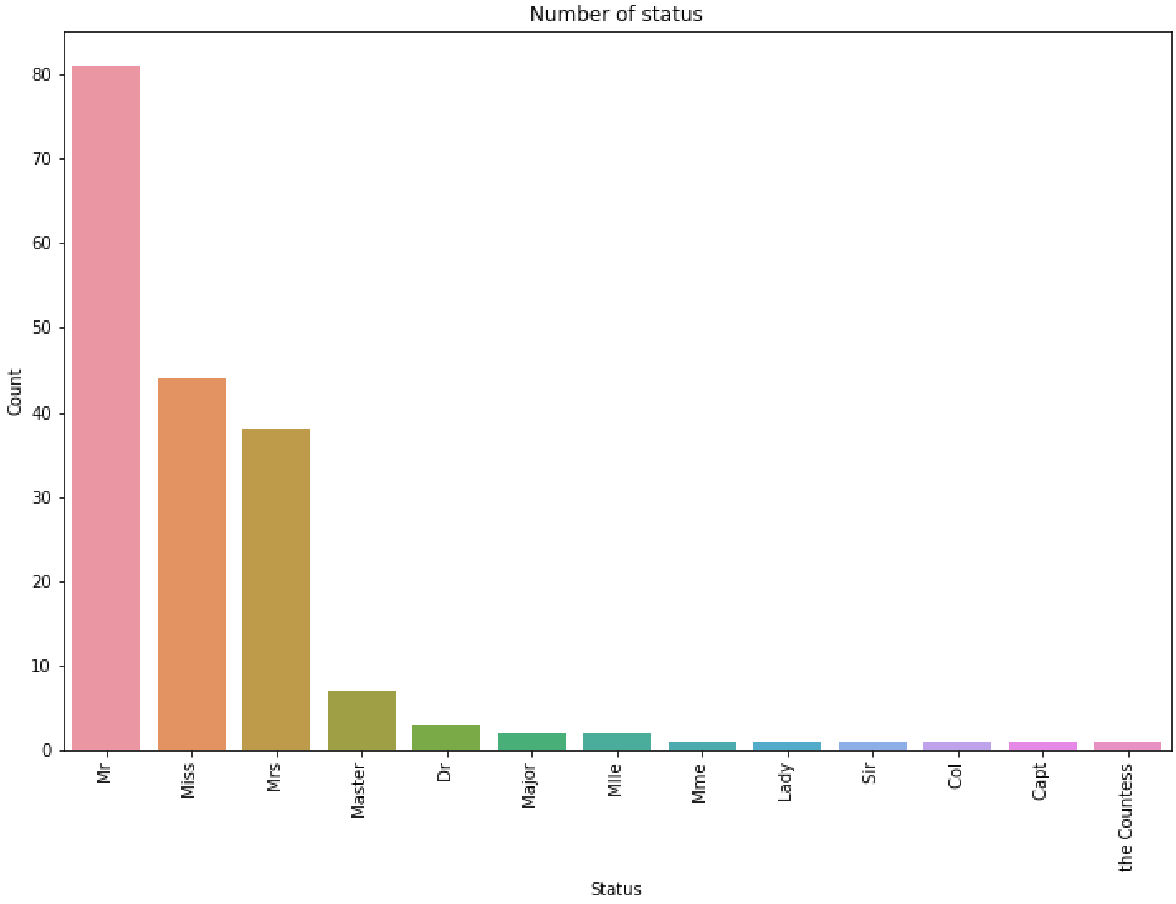
```
 Mr              81
 Miss            44
 Mrs             38
 Master           7
 Dr               3
 Major            2
 Mlle             2
 Mme              1
 Lady             1
 Sir              1
 Col              1
 Capt             1
 the Countess     1
Name: Name, dtype: int64
```

In [144]:

```
# Data visualisation to see the number of status

status=Titanic_train['Name'].map(lambda row: row.split(',')[1].split('.')[0]).value_counts(
```

In [145]:

```
plt.figure(figsize=(12, 8))
sns.barplot(x=status.index, y=status.values)
plt.title('Number of status')
plt.xlabel('Status')
plt.ylabel('Count')
plt.xticks(rotation=90)
plt.show()
```



In [146]:

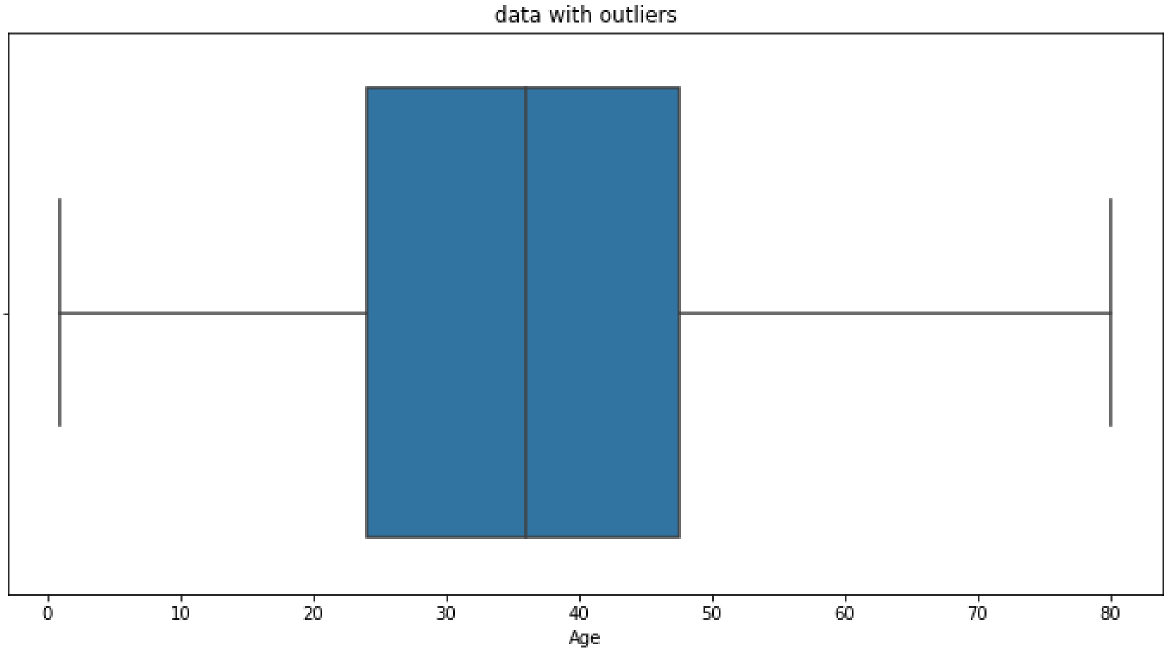
```
Titanic_train['Age'].value_counts()
```

Out[146]:

```
36.0    11
24.0     9
19.0     6
35.0     6
31.0     5
        ..
71.0     1
3.0      1
1.0      1
36.5     1
26.0     1
Name: Age, Length: 63, dtype: int64
```

In [148]:

```
plt.figure(figsize=(12,6))
sns.boxplot(Titanic_train['Age'])
plt.title('data with outliers')
plt.show()
```



In [149]:

```
Titanic_train['Age'].describe()
```

Out[149]:

```
count    183.000000
mean      35.674426
std       15.643866
min        0.920000
25%       24.000000
50%       36.000000
75%       47.500000
max       80.000000
Name: Age, dtype: float64
```

In [150]:

```
Titanic_train['Age'].median()
```

Out[150]:

```
36.0
```

In [151]:

```
def out_bound(Titanic_train, col):
    Q1=Titanic_train[col].quantile(0.25)
    Q3=Titanic_train[col].quantile(0.75)
    IQR=Q3-Q1
    lower_bound=Q1-1.5*IQR
    upper_bound=Q3+1.5*IQR

    return lower_bound, upper_bound
```

In [152]:

```
print(out_bound(Titanic_train, 'Age'))
```

```
(-11.25, 82.75)
```

In [153]:

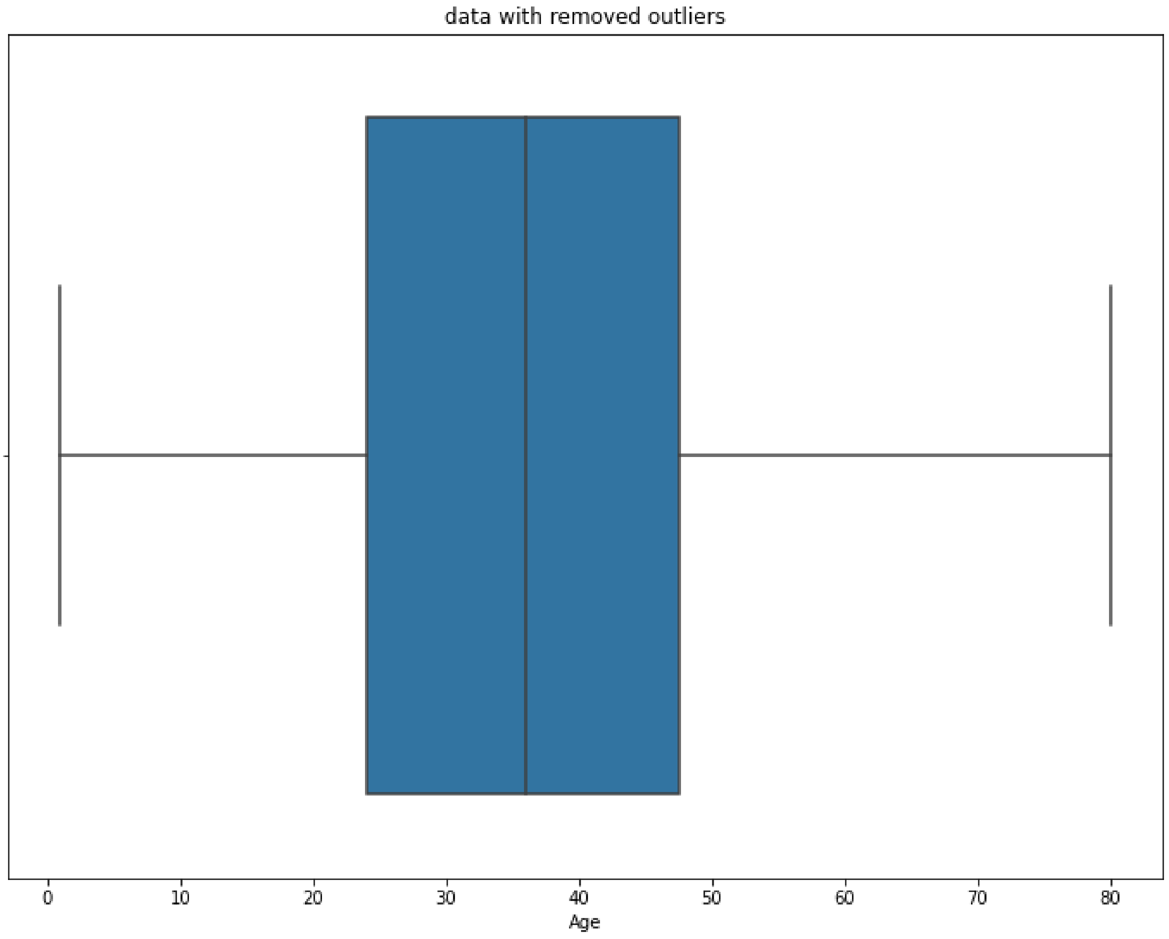
```
#Remove outliers
def remove_outliers(data, col):
    l_b, u_b=out_bound(data, col)

    return data[ (data[col]>l_b) & (data[col]<u_b) ]
```

In [154]:

```
data1=remove_outliers(Titanic_train, 'Age')
```

In [155]:

```
plt.figure(figsize=(12,9))
sns.boxplot(data1['Age'])
plt.title('data with removed outliers')
plt.show()
```



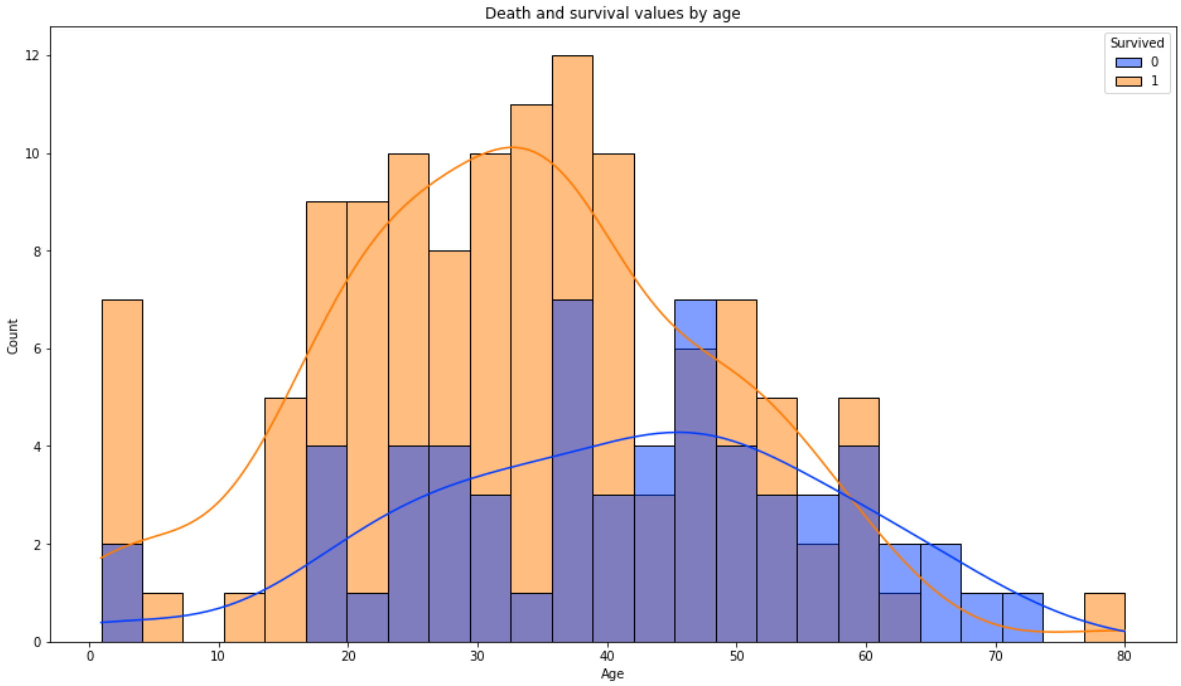
In [156]:

```
Titanic_train.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 183 entries, 1 to 889
Data columns (total 12 columns):
 #   Column       Non-Null Count  Dtype  
---  ------       --------------  -----  
 0   PassengerId  183 non-null    int64  
 1   Survived     183 non-null    int64  
 2   Pclass       183 non-null    int64  
 3   Name         183 non-null    object 
 4   Sex          183 non-null    object 
 5   Age          183 non-null    float64
 6   SibSp        183 non-null    int64  
 7   Parch        183 non-null    int64  
 8   Ticket       183 non-null    object 
 9   Fare         183 non-null    float64
 10  Cabin        183 non-null    object 
 11  Embarked     183 non-null    object 
dtypes: float64(2), int64(5), object(5)
memory usage: 18.6+ KB
```

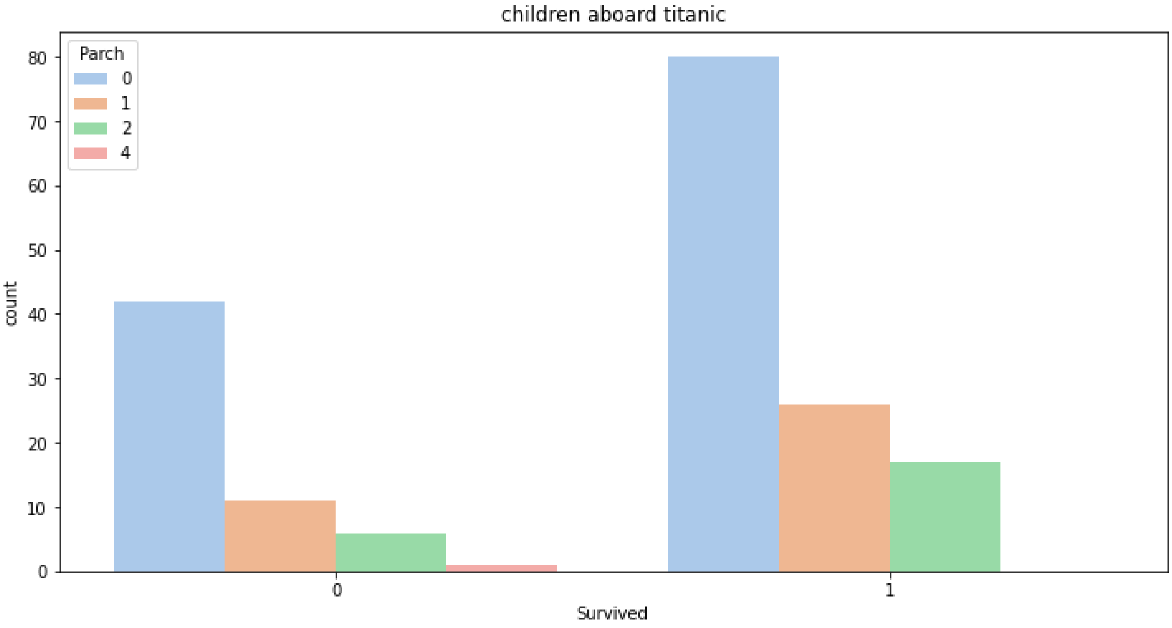
In [163]:

```
fig, ax1 = plt.subplots(figsize=(16, 9))
sns.set_palette('bright')
sns.histplot(data = Titanic_train, x='Age', ax=ax1, bins=25, hue='Survived', kde=True)
plt.title('Death and survival values by age')
plt.show()
```



In [165]:

```
sns.set_palette('pastel')
plt.figure(figsize=(12,6))
sns.countplot(x='Survived', hue='Parch', data = Titanic_train)
plt.title('children aboard titanic')
plt.show()
```



In [119]:

```
#Print the unique values in the columns
print(titanic['sex'].unique())
print(titanic['embarked'].unique())
```

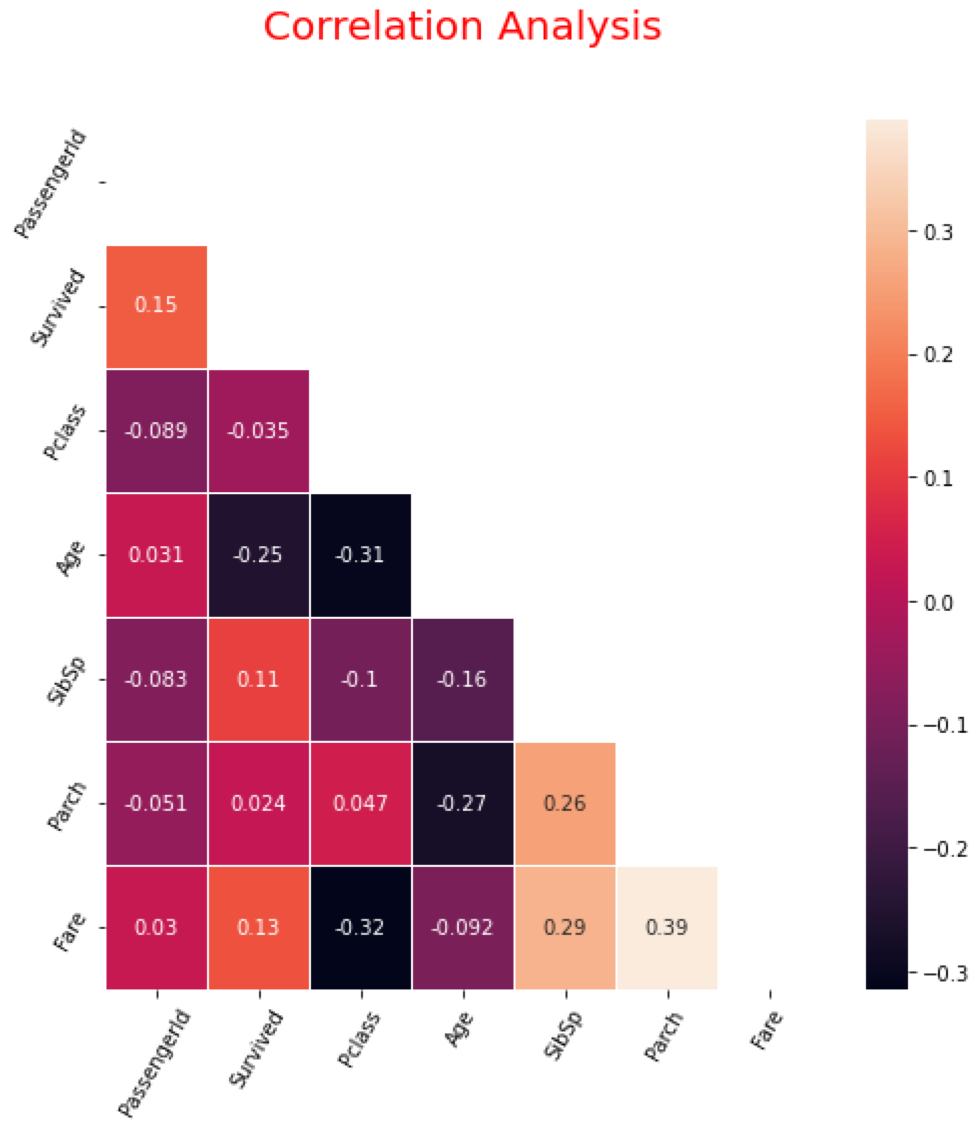
```
['male' 'female']
['S' 'C' 'Q' nan]
```

In [173]:

```
#Correlation analysis
corr=Titanic_train.corr()
```

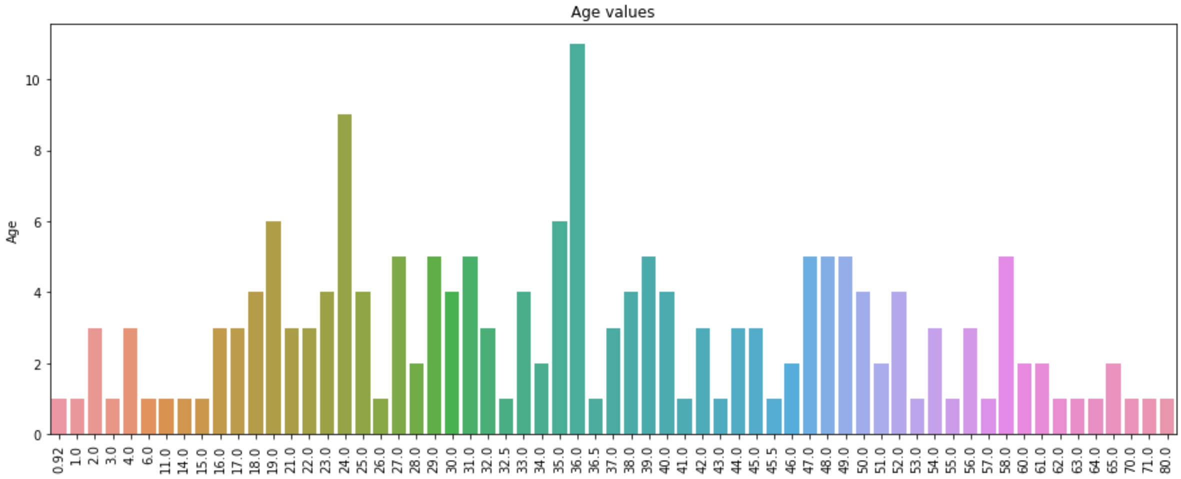
In [175]:

```
plt.figure(figsize=(8,8))
plt.title('Correlation Analysis',color='Red',fontsize=20,pad=40)
mask = np.triu(np.ones_like(corr, dtype = bool))
sns.heatmap(Titanic_train.corr(), mask=mask, annot=True, linewidths=.5);
plt.xticks(rotation=60)
plt.yticks(rotation = 60)
plt.show()
```



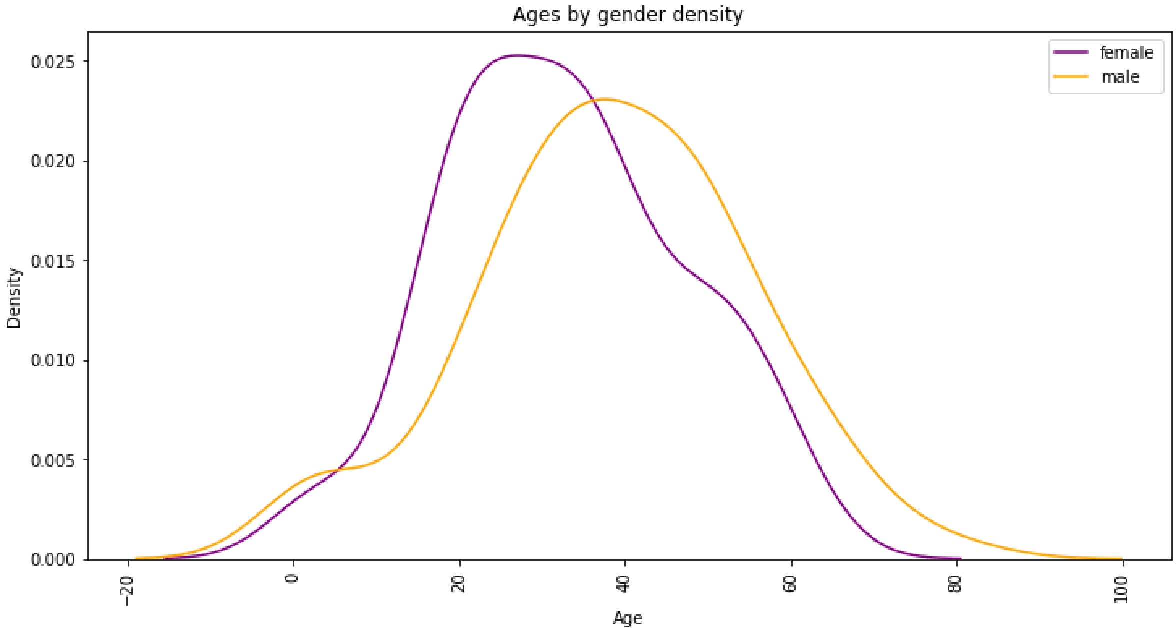
In [178]:

```
plt.figure(figsize=(16, 6))
sns.barplot(x=Titanic_train['Age'].value_counts().index, y=Titanic_train['Age'].value_count
plt.title('Age values')
plt.xticks(rotation=90)
plt.show()
```



In [179]:

```
plt.figure(figsize=(12,6))
sns.kdeplot(Titanic_train[Titanic_train['Sex']=='female']['Age'], color='purple', label='fe
sns.kdeplot(Titanic_train[Titanic_train['Sex']=='male']['Age'], color='orange', label='male
plt.title('Ages by gender density')
plt.xticks(rotation='vertical')
plt.legend()
plt.show()
```



In [120]:

```
#Encoding categorical data values (Transforming object data types to integers)
from sklearn.preprocessing import LabelEncoder
labelencoder = LabelEncoder()

#Encode sex column
titanic.iloc[:,2]= labelencoder.fit_transform(titanic.iloc[:,2].values)
#print(labelencoder.fit_transform(titanic.iloc[:,2].values))

#Encode embarked
titanic.iloc[:,7]= labelencoder.fit_transform(titanic.iloc[:,7].values)
#print(labelencoder.fit_transform(titanic.iloc[:,7].values))

#Print the NEW unique values in the columns
print(titanic['sex'].unique())
print(titanic['embarked'].unique())
```

```
[1 0]
[2 0 1 3]
```

In [121]:

```
#Split the data into independent 'X' and dependent 'Y' variables
X = titanic.iloc[:, 1:8].values
Y = titanic.iloc[:, 0].values
```

In [123]:

```
# Split the dataset into 80% Training set and 20% Testing set
from sklearn.model_selection import train_test_split
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size = 0.2, random_state = 0
```

In [181]:

```
#Feature Scaling
from sklearn.preprocessing import StandardScaler
sc = StandardScaler()
X_train = sc.fit_transform(X_train)
X_test = sc.transform(X_test)
```

In [187]:

```
#After Scaling
pd.DataFrame(X_train, columns=headers).head()
```

```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
Input In [187], in <cell line: 2>()
      1 #After Scaling
----> 2 pd.DataFrame(X_train, columns=headers).head()

NameError: name 'headers' is not defined
```

In [ ]: