In [1]:

```
import pandas as pd
```

In [2]:

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

In [3]:

```
df.head()
```

Out[3]:

	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 [4]:

```
df.tail()
```

Out[4]:

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

In [5]:

```
df.shape
```

Out[5]:

```
(891, 12)
```

In [6]:

```
df.columns
```

Out[6]:

```
Index(['PassengerId', 'Survived', 'Pclass', 'Name', 'Sex', 'Age', 'SibSp',
       'Parch', 'Ticket', 'Fare', 'Cabin', 'Embarked'],
      dtype='object')
```

In [7]:

```
df.duplicated().sum()
```

Out[7]:

```
0
```

In [8]:

```
df.isnull().sum()
```

Out[8]:

```
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 [9]:

```
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 [10]:

```
df.describe()
```

Out[10]:

	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 [11]:

```
df.nunique()
```

Out[11]:

```
PassengerId    891
Survived         2
Pclass           3
Name           891
Sex              2
Age             88
SibSp            7
Parch            7
Ticket         681
Fare           248
Cabin          147
Embarked         3
dtype: int64
```

In [12]:

```
df['Age'].fillna(df['Age'].mean(), inplace=True)
```

In [13]:

```
df['Cabin'].fillna(df['Cabin'].mode()[0], inplace=True)
df['Embarked'].fillna(df['Embarked'].mode()[0], inplace=True)
```

In [14]:

```
df.isnull().sum()
```

Out[14]:

```
PassengerId    0
Survived       0
Pclass         0
Name           0
Sex            0
Age            0
SibSp          0
Parch          0
Ticket         0
Fare           0
Cabin          0
Embarked       0
dtype: int64
```

In [15]:

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

In [16]:

```
import warnings
warnings.filterwarnings('ignore')
```

In [17]:

```
df['Survived'].unique()
```

Out[17]:

```
array([0, 1], dtype=int64)
```

In [18]:

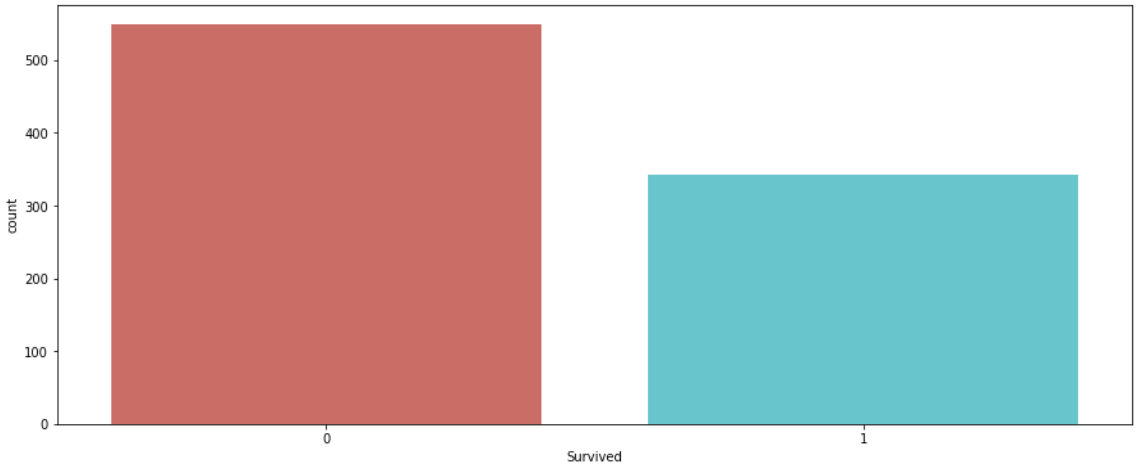
```
df['Survived'].value_counts()
```

Out[18]:

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

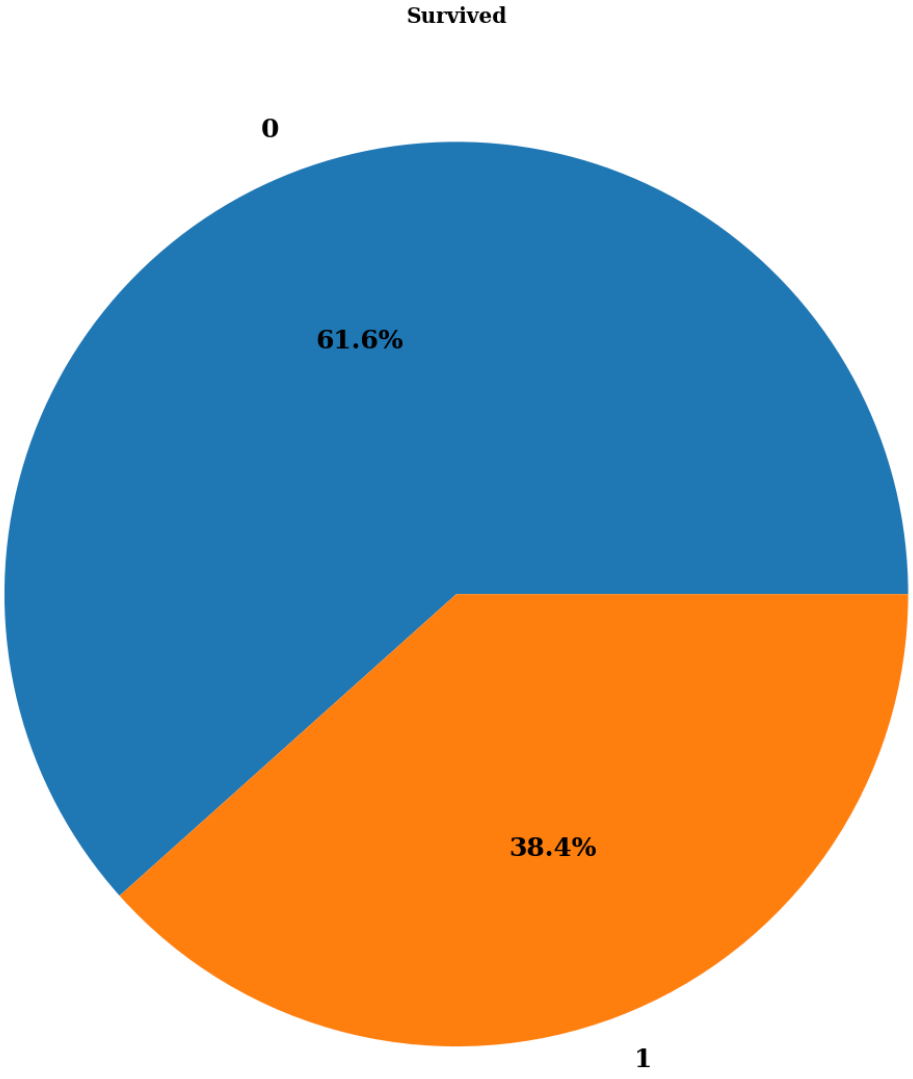
In [19]:

```
plt.figure(figsize=(15,6))
sns.countplot(df['Survived'], data = df, palette = 'hls')
plt.show()
```



In [20]:

```
plt.figure(figsize=(30,20))
plt.pie(df['Survived'].value_counts(), labels=df['Survived'].value_counts().index, autop
                                            'color': 'black',
                                            'weight': 'bold',
                                            'family': 'serif' })
hfont = {'fontname':'serif', 'weight': 'bold'}
plt.title('Survived', size=20, **hfont)
plt.show()
```



In [21]:

```
df['Pclass'].unique()
```

Out[21]:

```
array([3, 1, 2], dtype=int64)
```

In [22]:

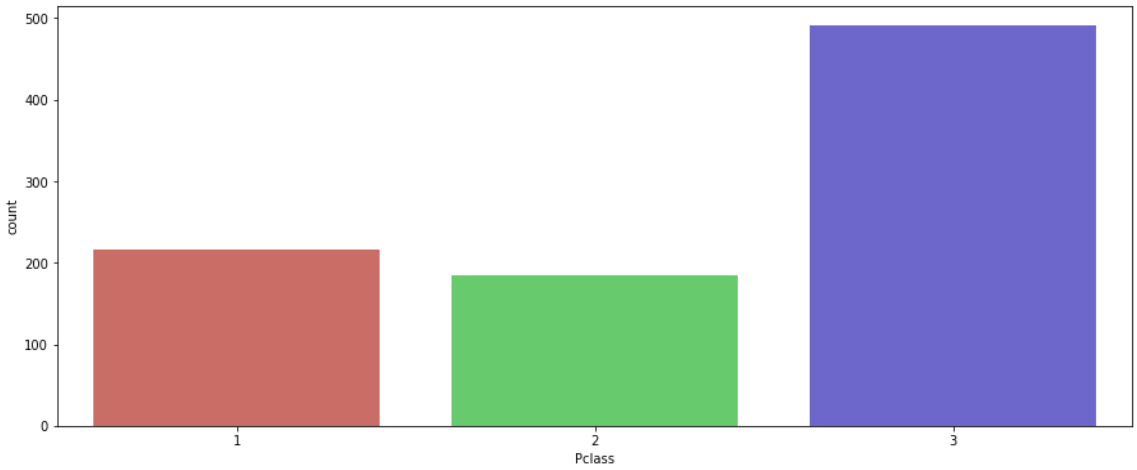
```
df['Pclass'].value_counts()
```

Out[22]:

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

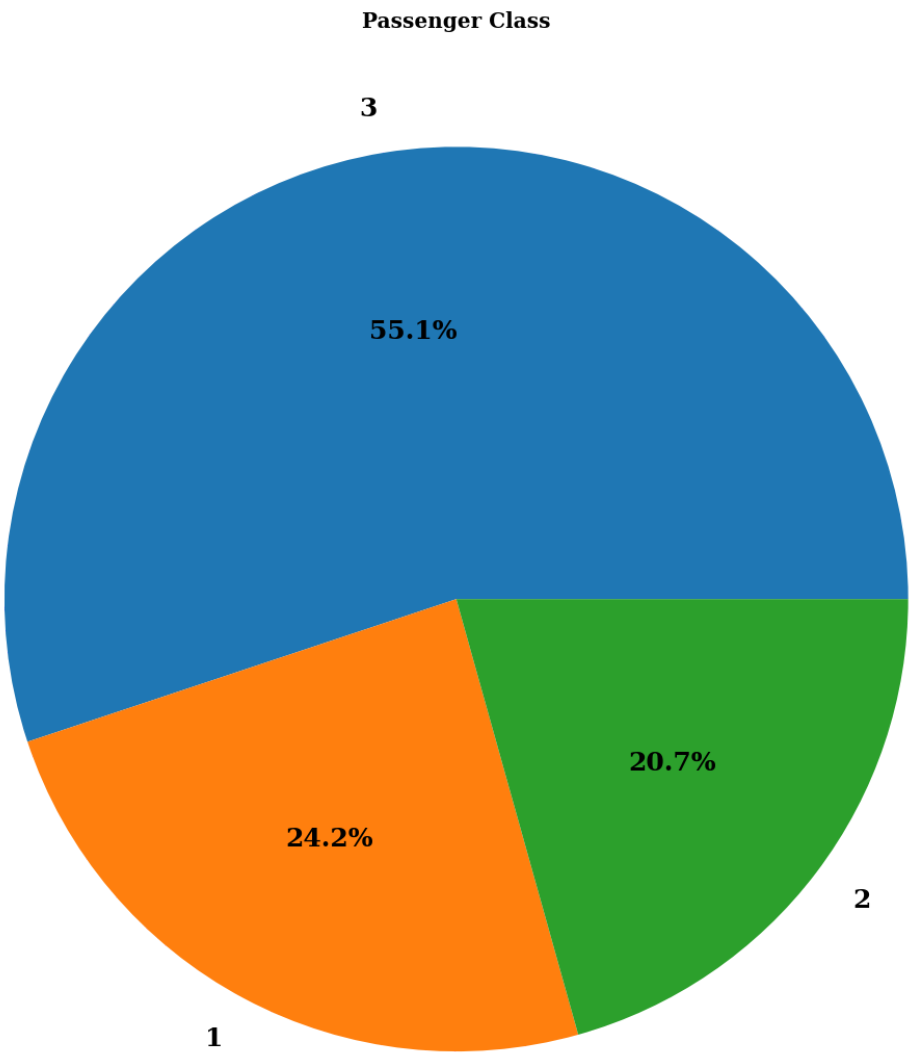
In [23]:

```
plt.figure(figsize=(15,6))
sns.countplot(df['Pclass'], data = df, palette = 'hls')
plt.show()
```



In [24]:

```
plt.figure(figsize=(30,20))
plt.pie(df['Pclass'].value_counts(), labels=df['Pclass'].value_counts().index, autopct='
                                        'color': 'black',
                                        'weight': 'bold',
                                        'family': 'serif' })
hfont = {'fontname':'serif', 'weight': 'bold'}
plt.title('Passenger Class', size=20, **hfont)
plt.show()
```



In [25]:

```
df['Sex'].unique()
```

Out[25]:

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

In [26]:

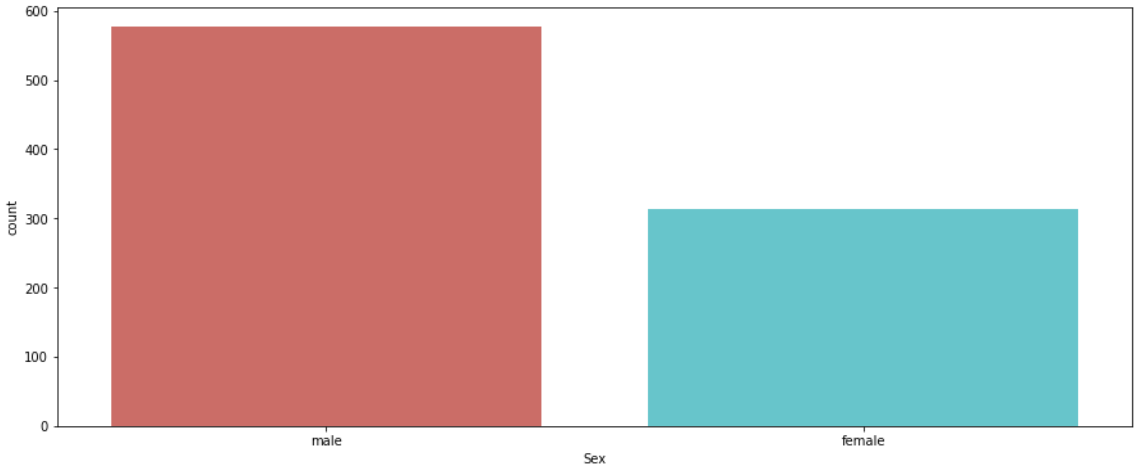
```
df['Sex'].value_counts()
```

Out[26]:

```
male      577
female    314
Name: Sex, dtype: int64
```

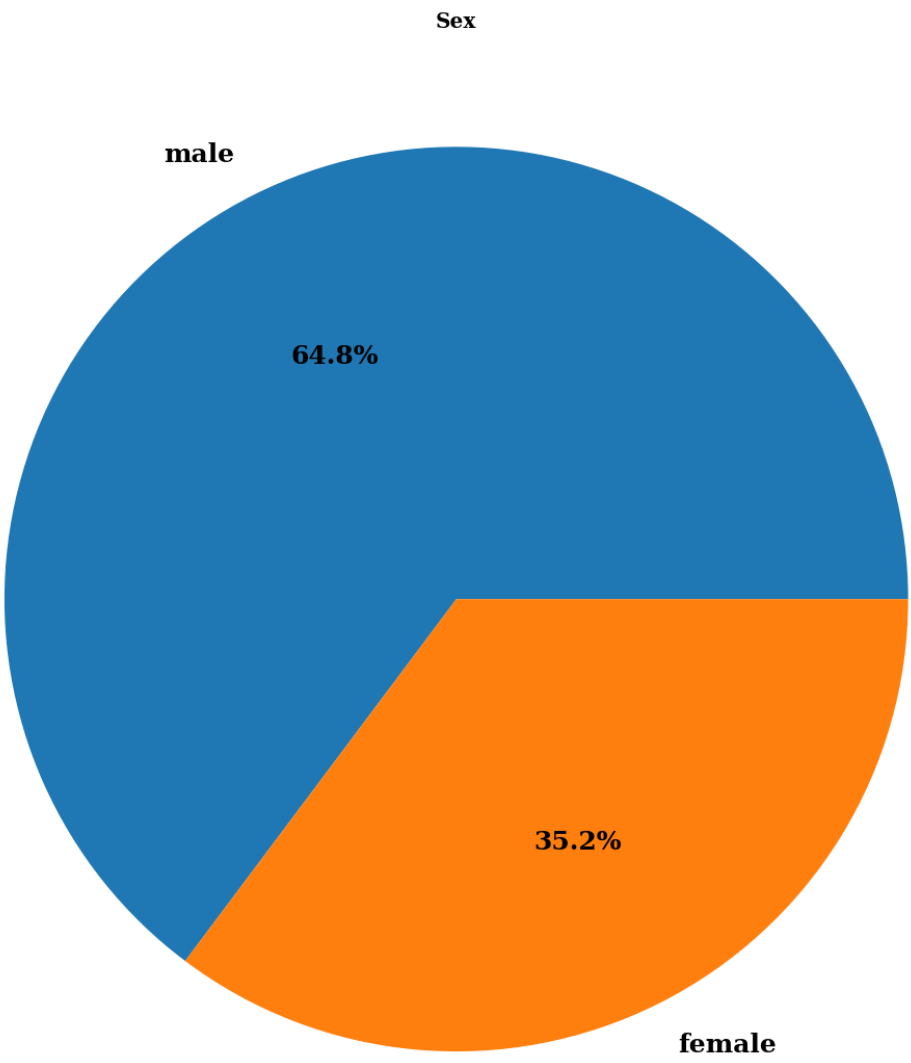
In [27]:

```
plt.figure(figsize=(15,6))
sns.countplot(df['Sex'], data = df, palette = 'hls')
plt.show()
```



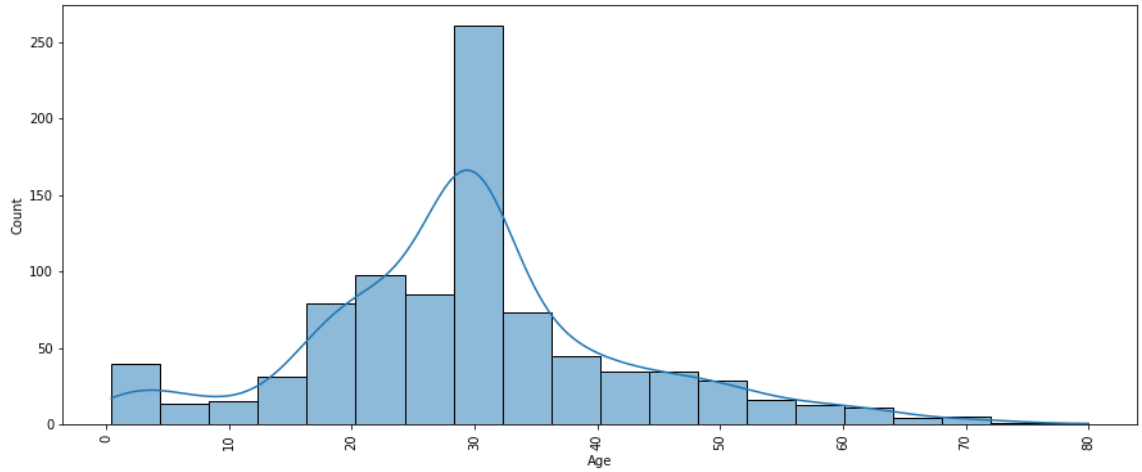
In [28]:

```
plt.figure(figsize=(30,20))
plt.pie(df['Sex'].value_counts(), labels=df['Sex'].value_counts().index, autopct='%1.1f%
                                            'color': 'black',
                                            'weight': 'bold',
                                            'family': 'serif' })
hfont = {'fontname':'serif', 'weight': 'bold'}
plt.title('Sex', size=20, **hfont)
plt.show()
```



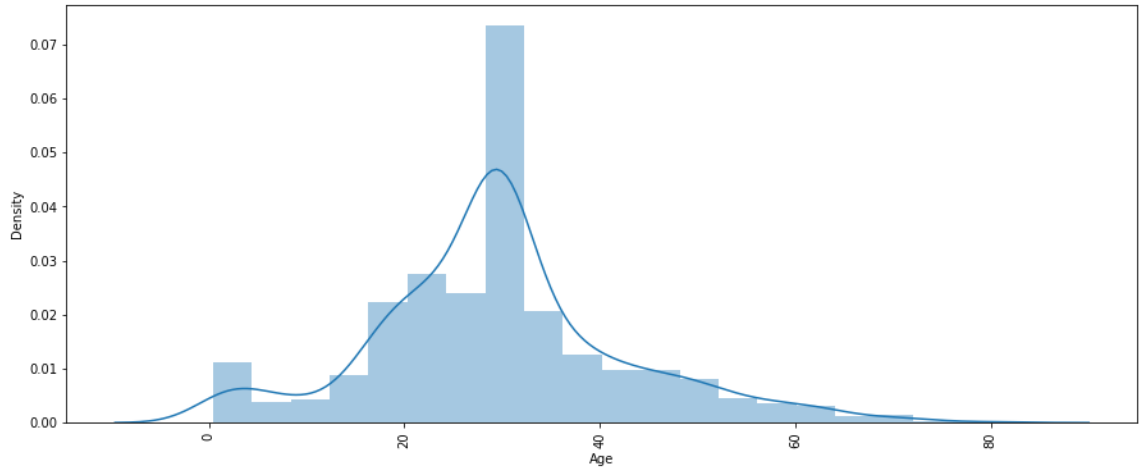
In [29]:

```
plt.figure(figsize=(15,6))
sns.histplot(df['Age'], kde = True, bins = 20, palette = 'hls')
plt.xticks(rotation = 90)
plt.show()
```



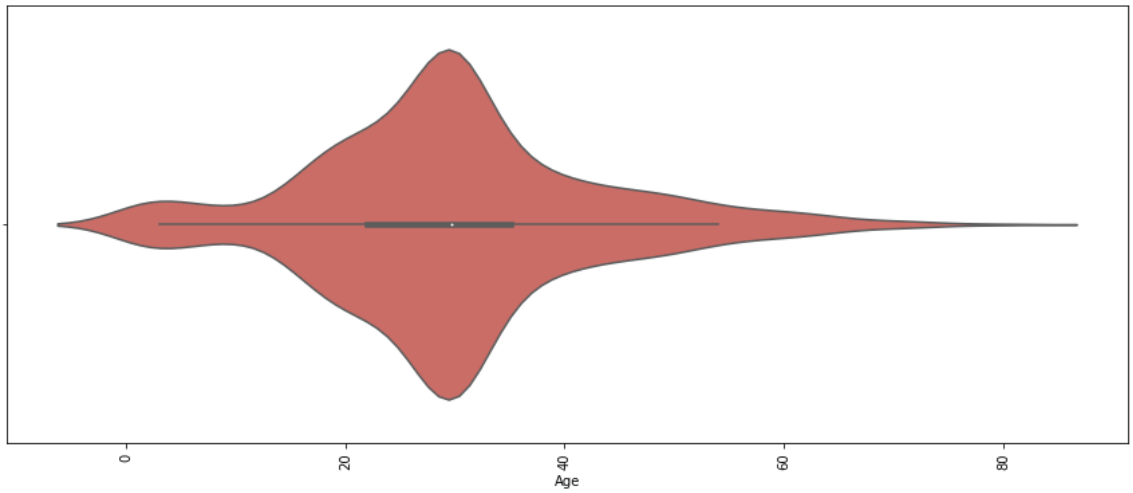
In [30]:

```
plt.figure(figsize=(15,6))
sns.distplot(df['Age'], kde = True, bins = 20)
plt.xticks(rotation = 90)
plt.show()
```



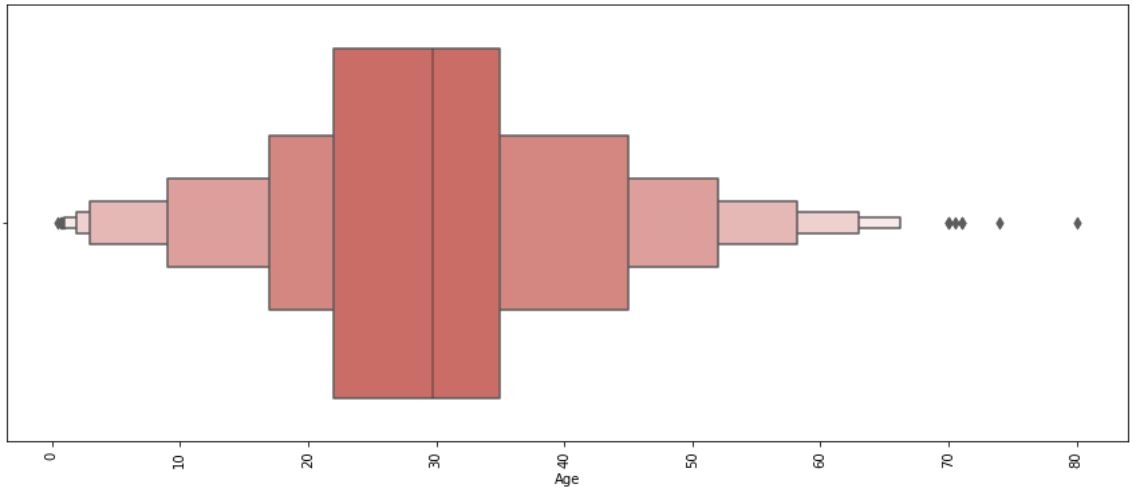
In [31]:

```
plt.figure(figsize=(15,6))
sns.violinplot(df['Age'], data = df, palette = 'hls')
plt.xticks(rotation = 90)
plt.show()
```



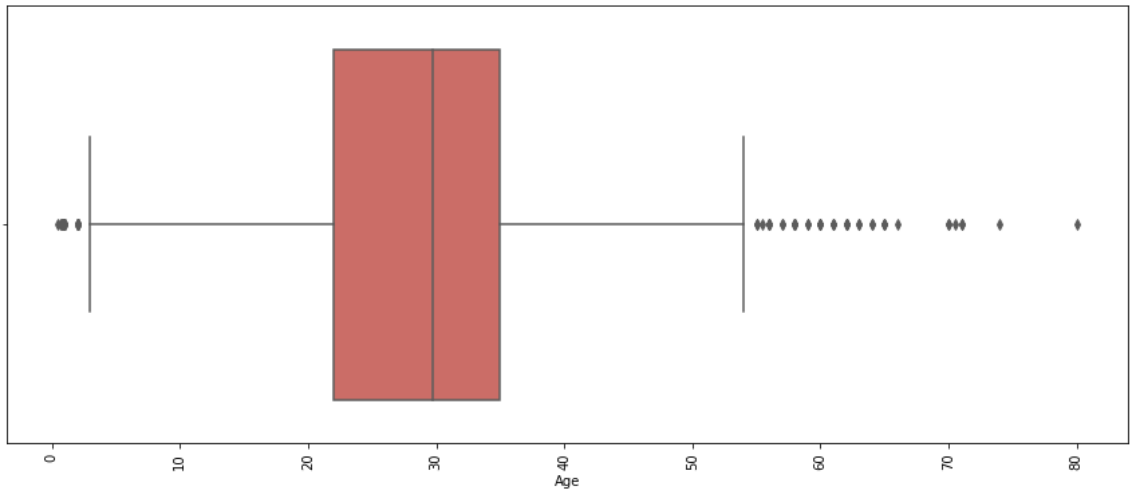
In [32]:

```
plt.figure(figsize=(15,6))
sns.boxenplot(df['Age'], data = df, palette = 'hls')
plt.xticks(rotation = 90)
plt.show()
```



In [33]:

```
plt.figure(figsize=(15,6))
sns.boxplot(df['Age'], data = df, palette = 'hls')
plt.xticks(rotation = 90)
plt.show()
```



In [34]:

```
df['SibSp'].unique()
```

Out[34]:

```
array([1, 0, 3, 4, 2, 5, 8], dtype=int64)
```

In [35]:

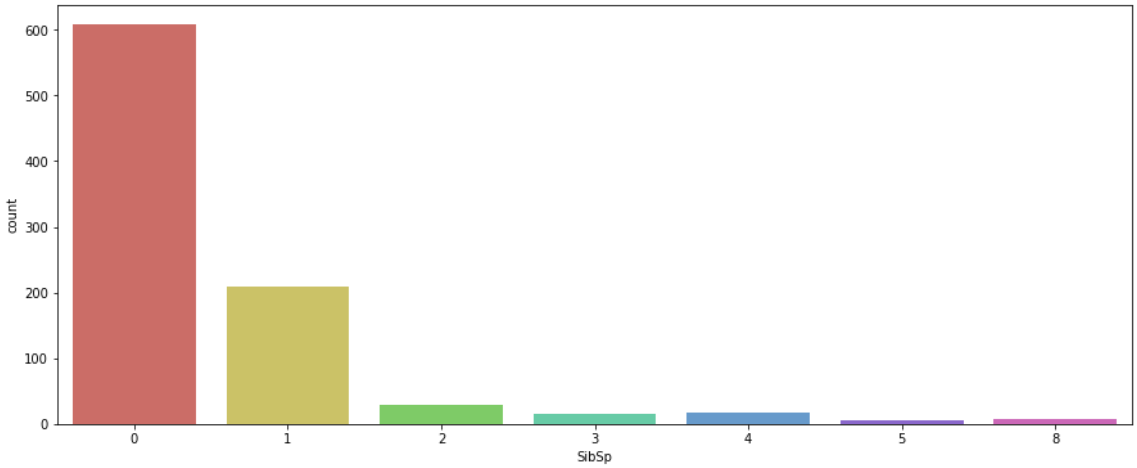
```
df['SibSp'].value_counts()
```

Out[35]:

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

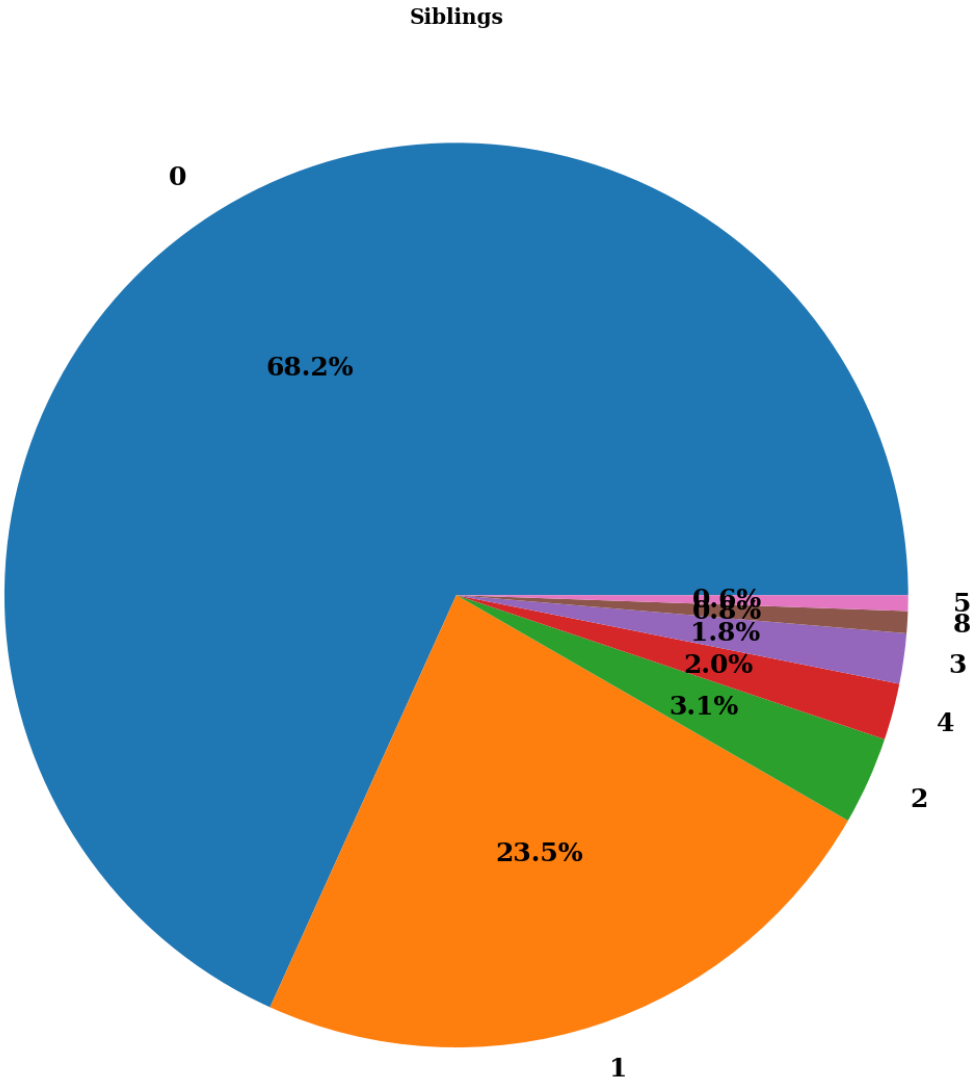
In [36]:

```
plt.figure(figsize=(15,6))
sns.countplot(df['SibSp'], data = df, palette = 'hls')
plt.show()
```



In [37]:

```
plt.figure(figsize=(30,20))
plt.pie(df['SibSp'].value_counts(), labels=df['SibSp'].value_counts().index, autopct='%1
                                          'color': 'black',
                                          'weight': 'bold',
                                          'family': 'serif' })
hfont = {'fontname':'serif', 'weight': 'bold'}
plt.title('Siblings', size=20, **hfont)
plt.show()
```



In [38]:

```
df['Parch'].unique()
```

Out[38]:

```
array([0, 1, 2, 5, 3, 4, 6], dtype=int64)
```

In [39]:

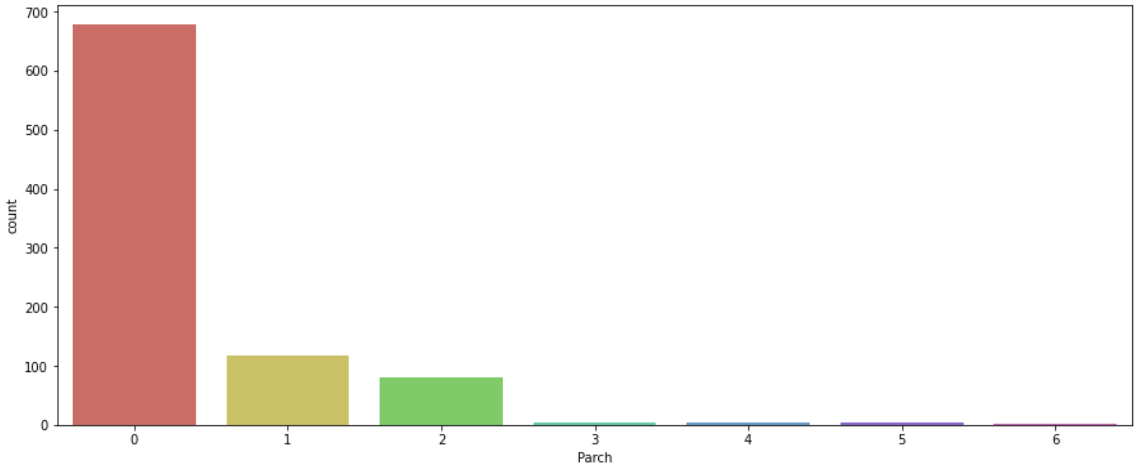
```
df['Parch'].value_counts()
```

Out[39]:

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

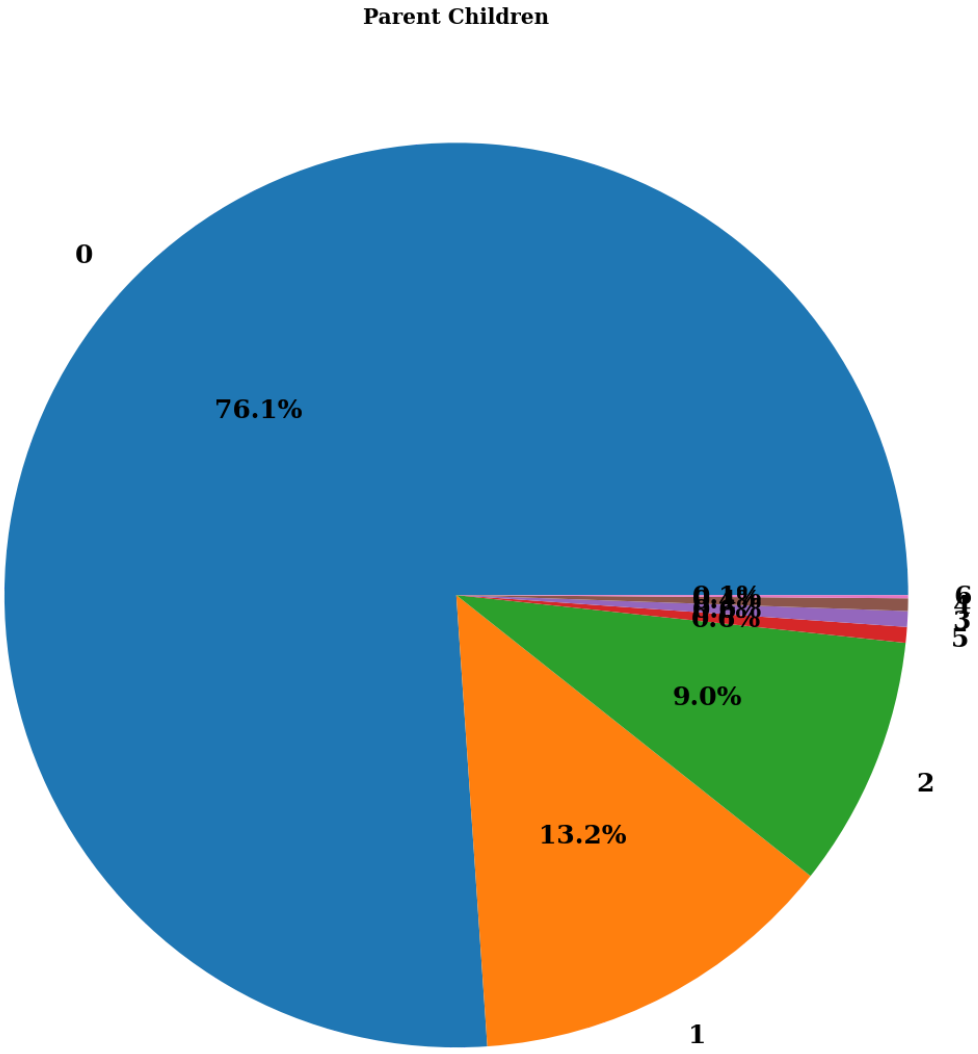
In [40]:

```
plt.figure(figsize=(15,6))
sns.countplot(df['Parch'], data = df, palette = 'hls')
plt.show()
```



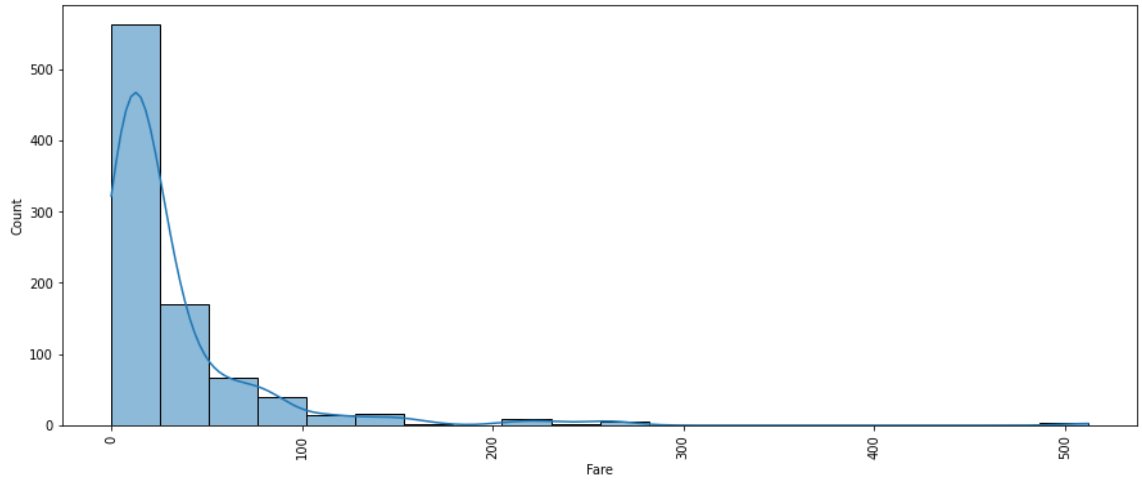
In [41]:

```
plt.figure(figsize=(30,20))
plt.pie(df['Parch'].value_counts(), labels=df['Parch'].value_counts().index, autopct='%1
                                        'color': 'black',
                                        'weight': 'bold',
                                        'family': 'serif' })
hfont = {'fontname':'serif', 'weight': 'bold'}
plt.title('Parent Children', size=20, **hfont)
plt.show()
```



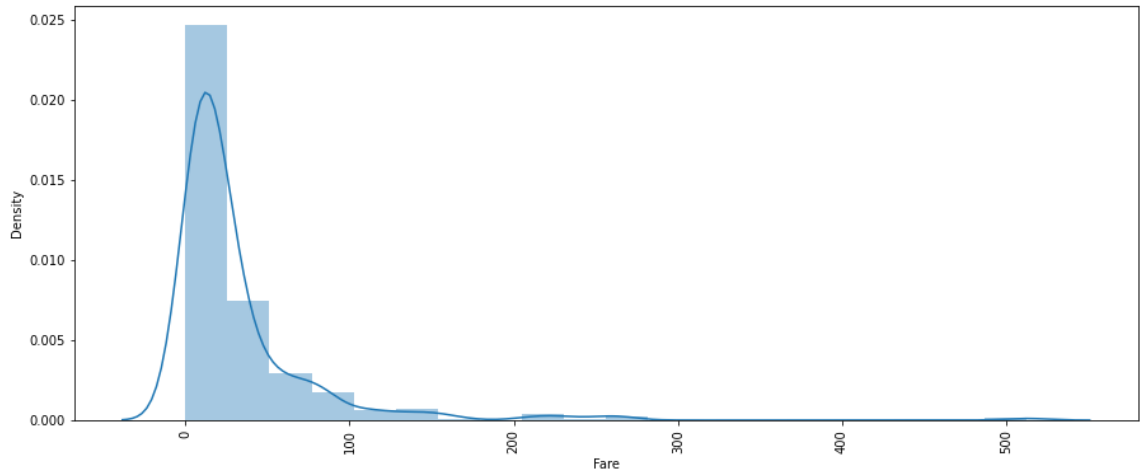
In [42]:

```
plt.figure(figsize=(15,6))
sns.histplot(df['Fare'], kde = True, bins = 20, palette = 'hls')
plt.xticks(rotation = 90)
plt.show()
```



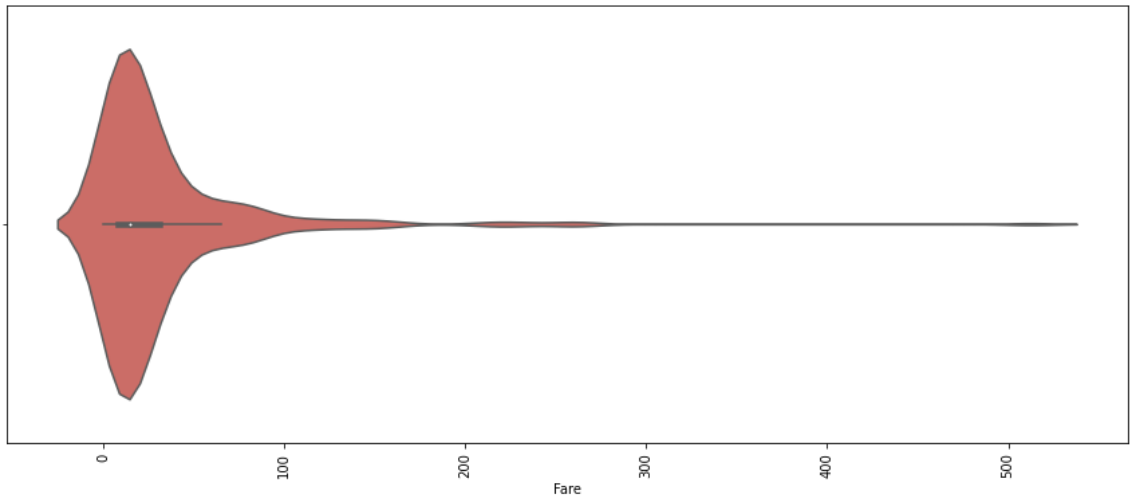
In [43]:

```
plt.figure(figsize=(15,6))
sns.distplot(df['Fare'], kde = True, bins = 20)
plt.xticks(rotation = 90)
plt.show()
```



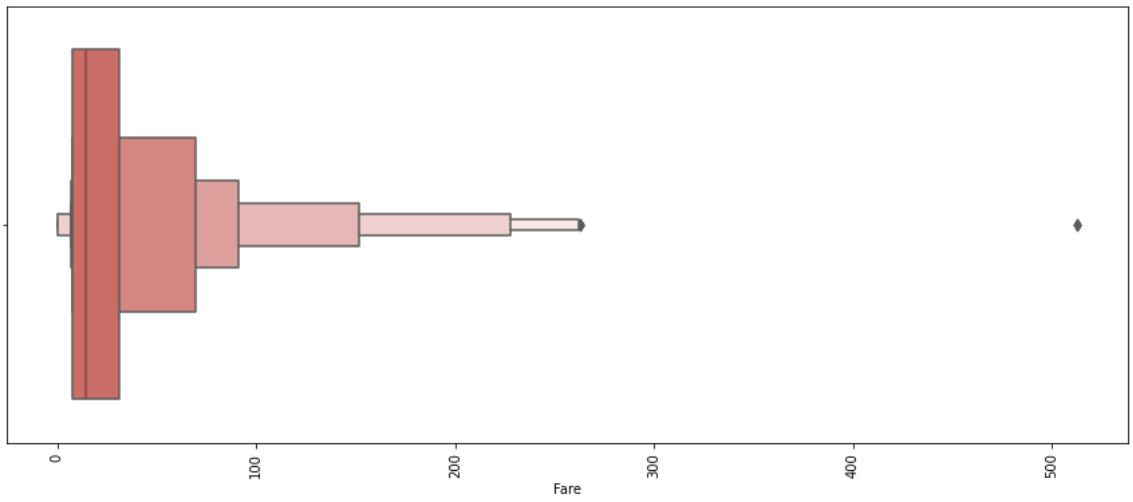
In [44]:

```
plt.figure(figsize=(15,6))
sns.violinplot(df['Fare'], data = df, palette = 'hls')
plt.xticks(rotation = 90)
plt.show()
```



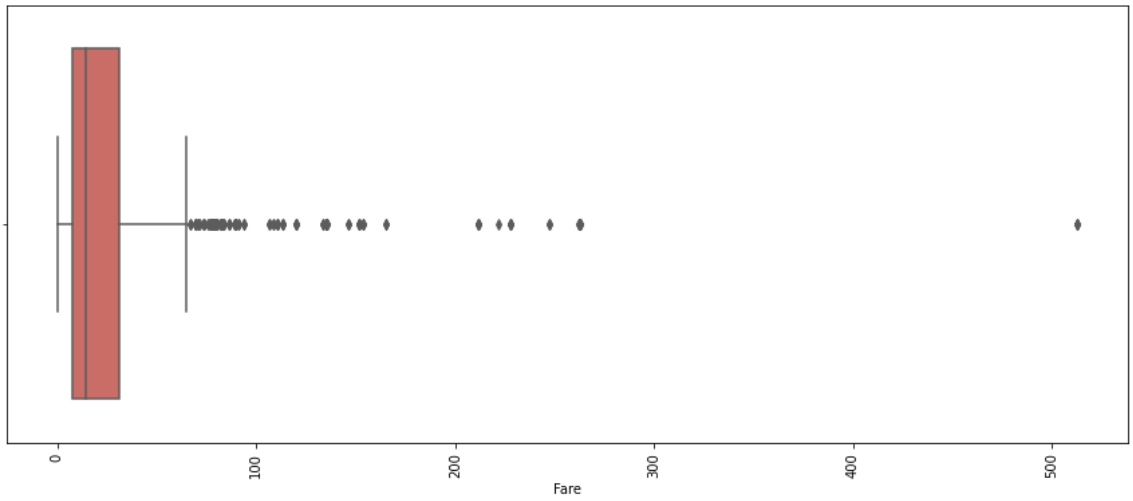
In [45]:

```
plt.figure(figsize=(15,6))
sns.boxenplot(df['Fare'], data = df, palette = 'hls')
plt.xticks(rotation = 90)
plt.show()
```



In [46]:

```
plt.figure(figsize=(15,6))
sns.boxplot(df['Fare'], data = df, palette = 'hls')
plt.xticks(rotation = 90)
plt.show()
```



In [47]:

```
df['Cabin'].unique()
```

Out[47]:

```
array(['B96 B98', 'C85', 'C123', 'E46', 'G6', 'C103', 'D56', 'A6',
       'C23 C25 C27', 'B78', 'D33', 'B30', 'C52', 'B28', 'C83', 'F33',
       'F G73', 'E31', 'A5', 'D10 D12', 'D26', 'C110', 'B58 B60', 'E101',
       'F E69', 'D47', 'B86', 'F2', 'C2', 'E33', 'B19', 'A7', 'C49', 'F4',
       'A32', 'B4', 'B80', 'A31', 'D36', 'D15', 'C93', 'C78', 'D35',
       'C87', 'B77', 'E67', 'B94', 'C125', 'C99', 'C118', 'D7', 'A19',
       'B49', 'D', 'C22 C26', 'C106', 'C65', 'E36', 'C54',
       'B57 B59 B63 B66', 'C7', 'E34', 'C32', 'B18', 'C124', 'C91', 'E40',
       'T', 'C128', 'D37', 'B35', 'E50', 'C82', 'E10', 'E44', 'A34',
       'C104', 'C111', 'C92', 'E38', 'D21', 'E12', 'E63', 'A14', 'B37',
       'C30', 'D20', 'B79', 'E25', 'D46', 'B73', 'C95', 'B38', 'B39',
       'B22', 'C86', 'C70', 'A16', 'C101', 'C68', 'A10', 'E68', 'B41',
       'A20', 'D19', 'D50', 'D9', 'A23', 'B50', 'A26', 'D48', 'E58',
       'C126', 'B71', 'B51 B53 B55', 'D49', 'B5', 'B20', 'F G63',
       'C62 C64', 'E24', 'C90', 'C45', 'E8', 'B101', 'D45', 'C46', 'D30',
       'E121', 'D11', 'E77', 'F38', 'B3', 'D6', 'B82 B84', 'D17', 'A36',
       'B102', 'B69', 'E49', 'C47', 'D28', 'E17', 'A24', 'C50', 'B42',
       'C148'], dtype=object)
```

In [48]:

```
df['Cabin'].value_counts()
```

Out[48]:

```
B96 B98        691
G6               4
C23 C25 C27      4
C22 C26          3
F33              3
              ...
E34              1
C7               1
C54              1
E36              1
C148             1
Name: Cabin, Length: 147, dtype: int64
```

In [49]:

```
df['Embarked'].unique()
```

Out[49]:

```
array(['S', 'C', 'Q'], dtype=object)
```

In [50]:

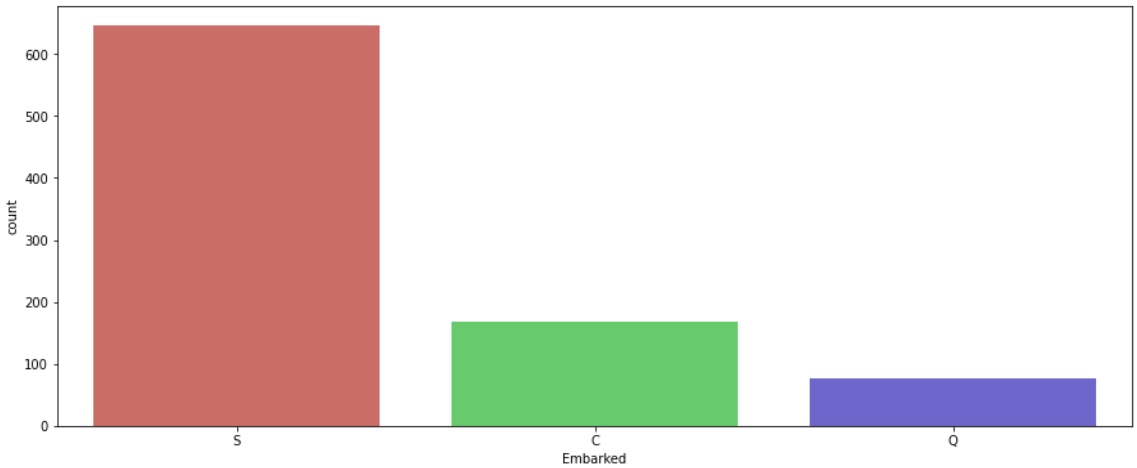
```
df['Embarked'].value_counts()
```

Out[50]:

```
S    646
C    168
Q     77
Name: Embarked, dtype: int64
```

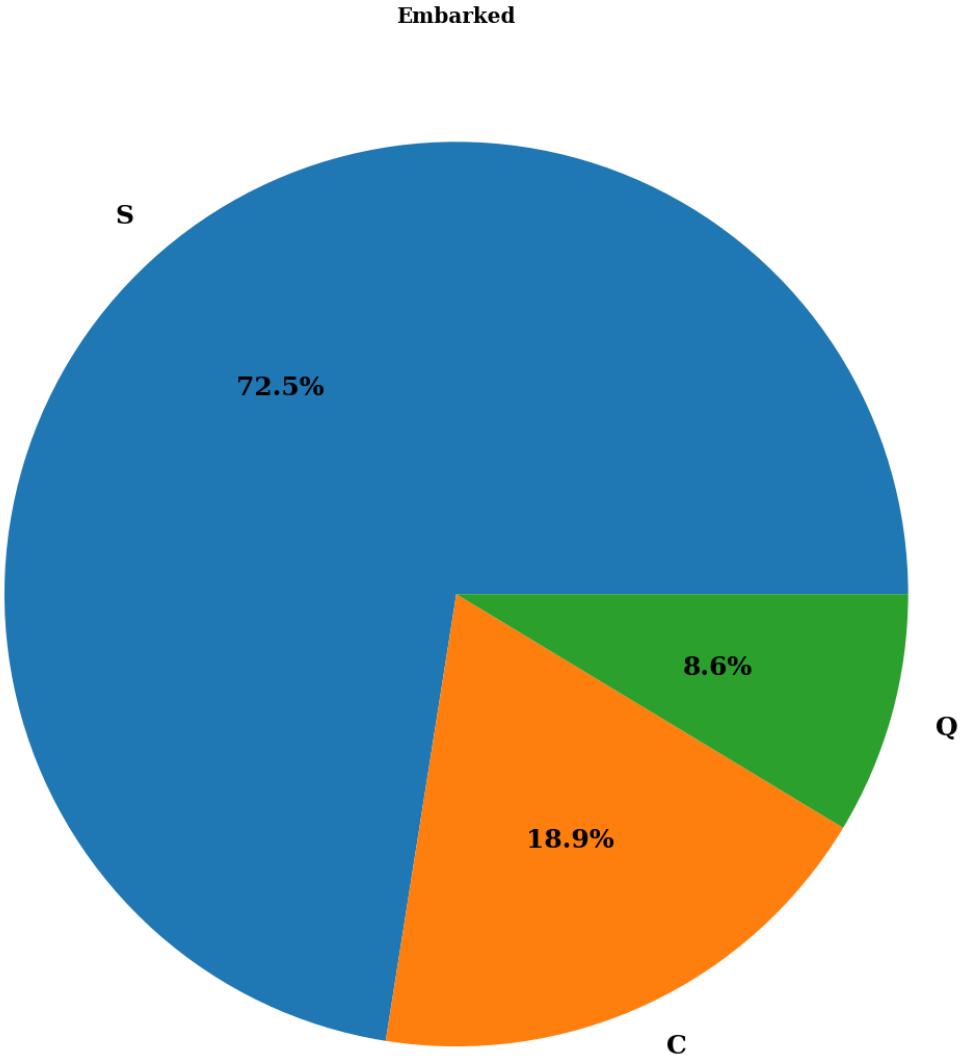
In [51]:

```
plt.figure(figsize=(15,6))
sns.countplot(df['Embarked'], data = df, palette = 'hls')
plt.show()
```



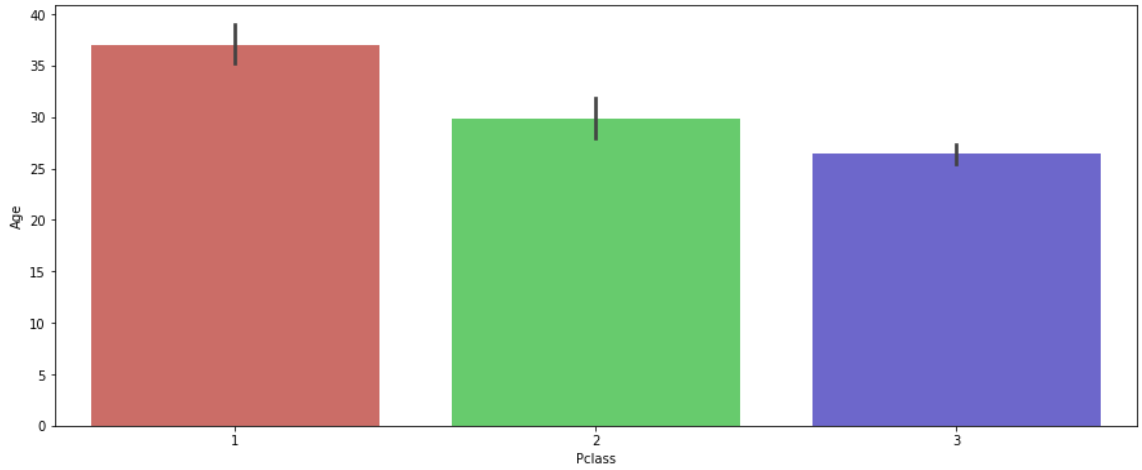
In [52]:

```
plt.figure(figsize=(30,20))
plt.pie(df['Embarked'].value_counts(), labels=df['Embarked'].value_counts().index, autop
                                        'color': 'black',
                                        'weight': 'bold',
                                        'family': 'serif' })
hfont = {'fontname':'serif', 'weight': 'bold'}
plt.title('Embarked', size=20, **hfont)
plt.show()
```



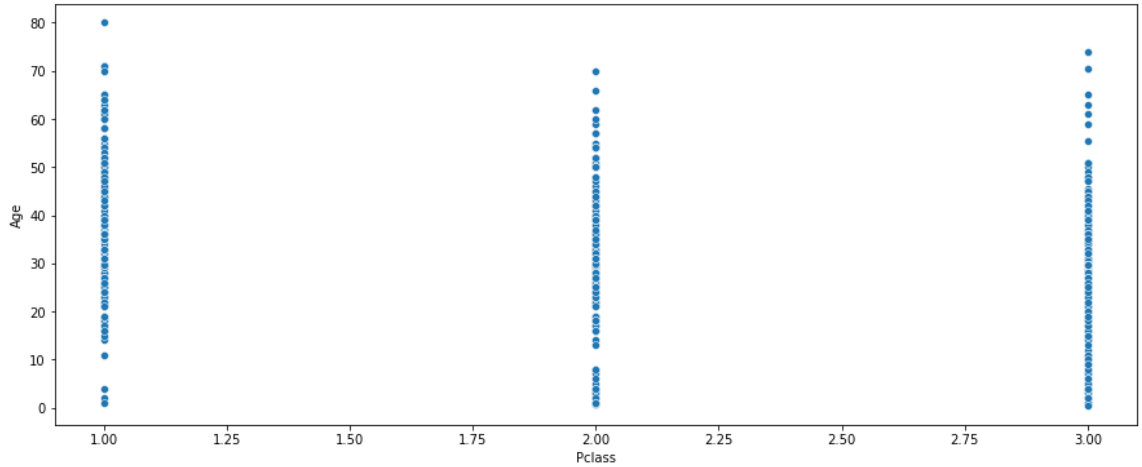
In [53]:

```
plt.figure(figsize=(15,6))
sns.barplot(x = df['Pclass'], y = df['Age'] , data = df, palette = 'hls')
plt.show()
```



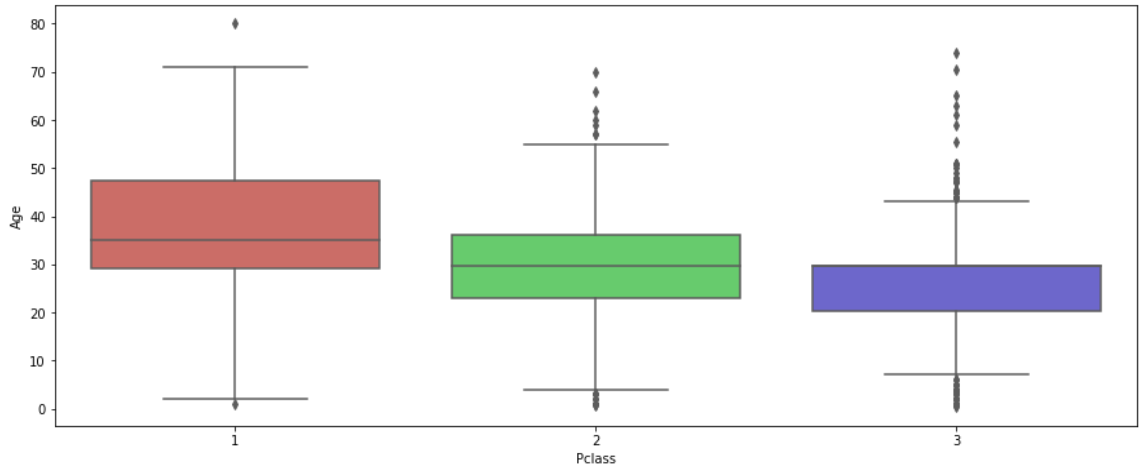
In [54]:

```
plt.figure(figsize=(15,6))
sns.scatterplot(x = df['Pclass'], y = df['Age'] , data = df, palette = 'hls')
plt.show()
```



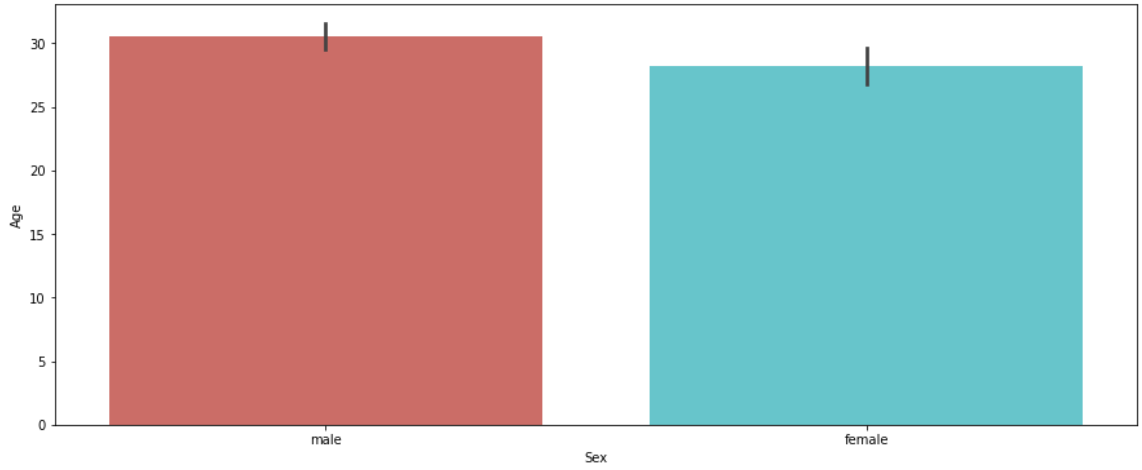
In [55]:

```
plt.figure(figsize=(15,6))
sns.boxplot(x = df['Pclass'], y = df['Age'] , data = df, palette = 'hls')
plt.show()
```



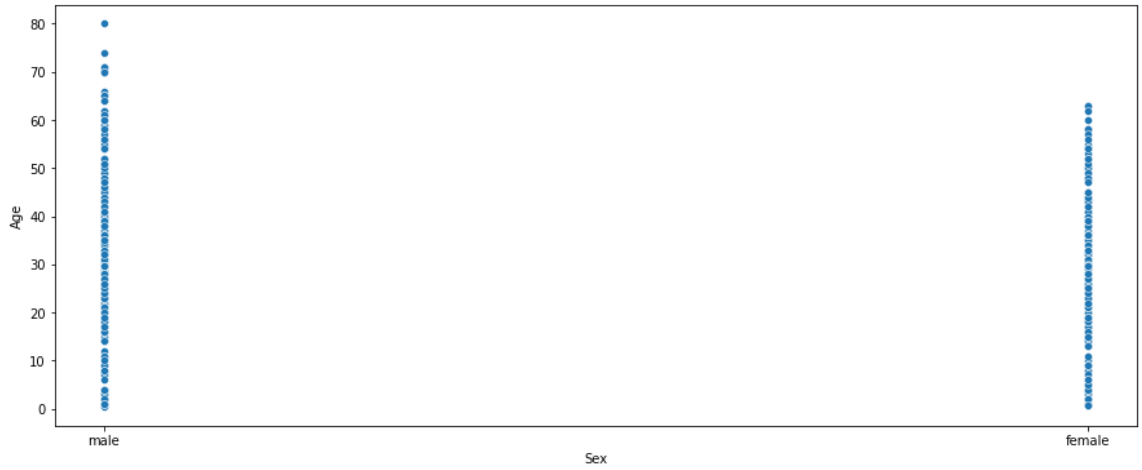
In [56]:

```
plt.figure(figsize=(15,6))
sns.barplot(x = df['Sex'], y = df['Age'] , data = df, palette = 'hls')
plt.show()
```



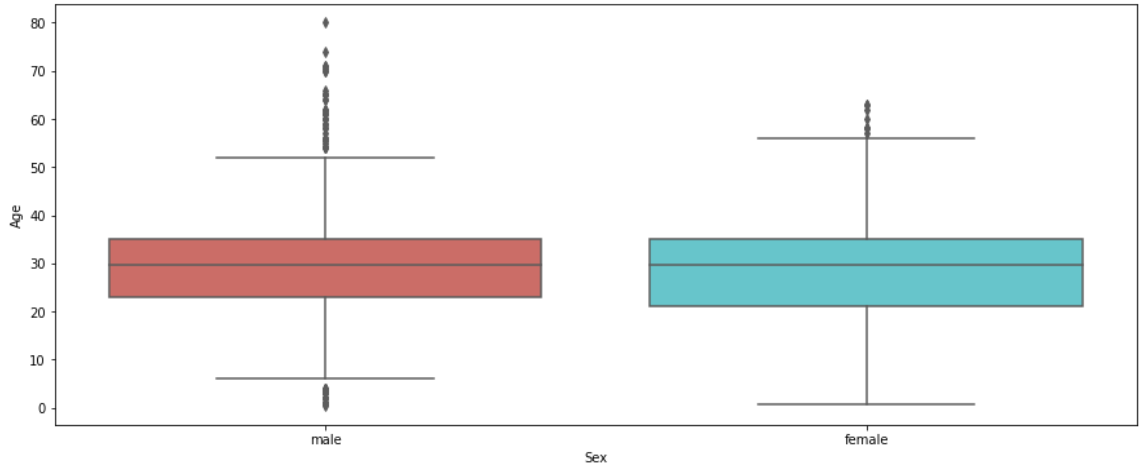
In [57]:

```
plt.figure(figsize=(15,6))
sns.scatterplot(x = df['Sex'], y = df['Age'] , data = df, palette = 'hls')
plt.show()
```



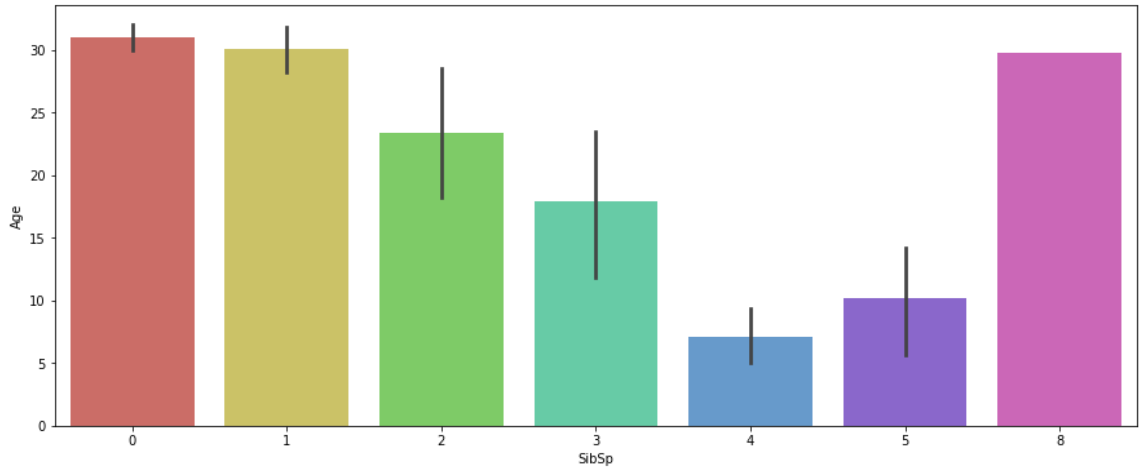
In [58]:

```
plt.figure(figsize=(15,6))
sns.boxplot(x = df['Sex'], y = df['Age'] , data = df, palette = 'hls')
plt.show()
```



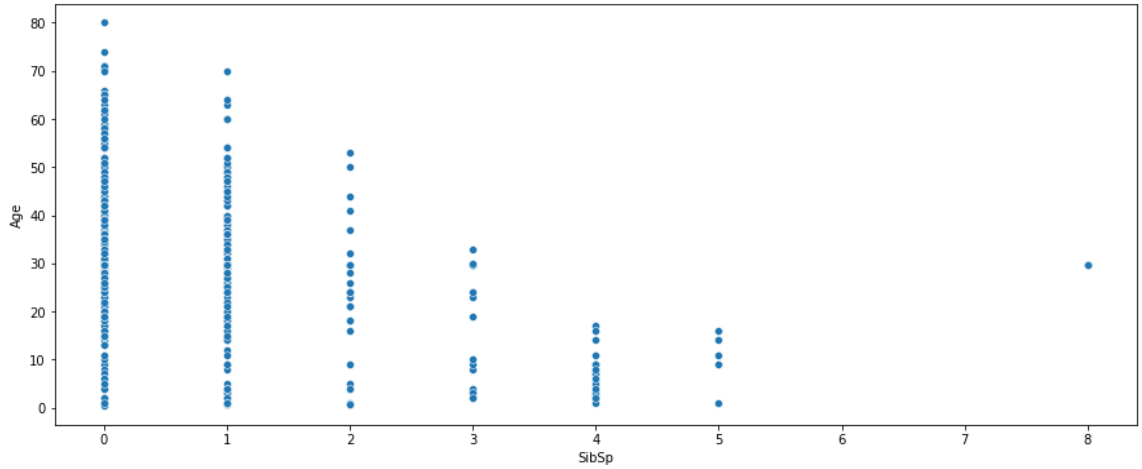
In [59]:

```
plt.figure(figsize=(15,6))
sns.barplot(x = df['SibSp'], y = df['Age'] , data = df, palette = 'hls')
plt.show()
```



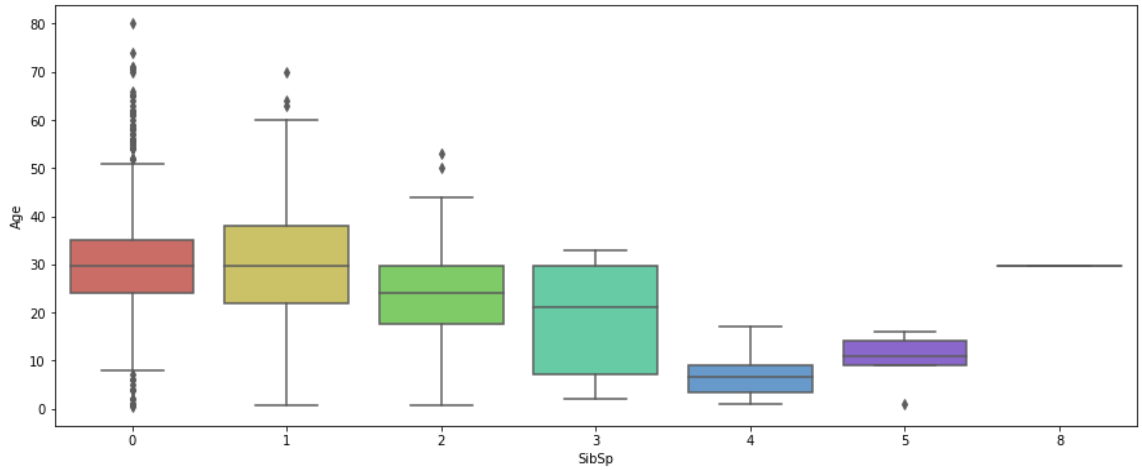
In [60]:

```
plt.figure(figsize=(15,6))
sns.scatterplot(x = df['SibSp'], y = df['Age'] , data = df, palette = 'hls')
plt.show()
```



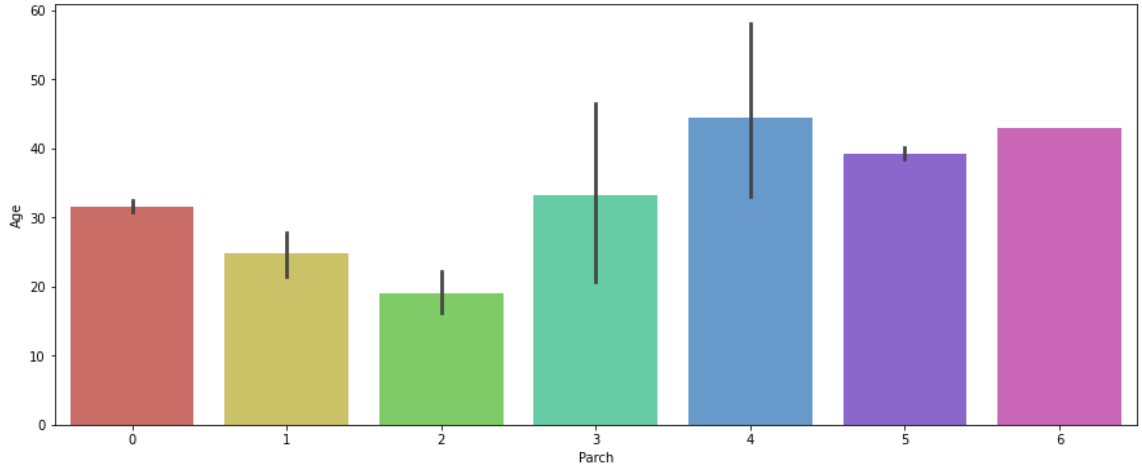
In [61]:

```
plt.figure(figsize=(15,6))
sns.boxplot(x = df['SibSp'], y = df['Age'] , data = df, palette = 'hls')
plt.show()
```



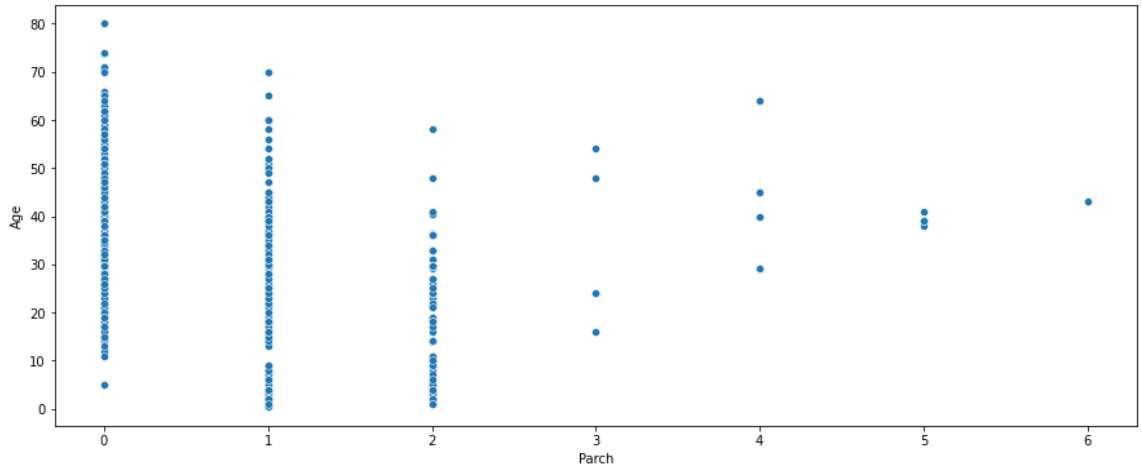
In [62]:

```
plt.figure(figsize=(15,6))
sns.barplot(x = df['Parch'], y = df['Age'] , data = df, palette = 'hls')
plt.show()
```



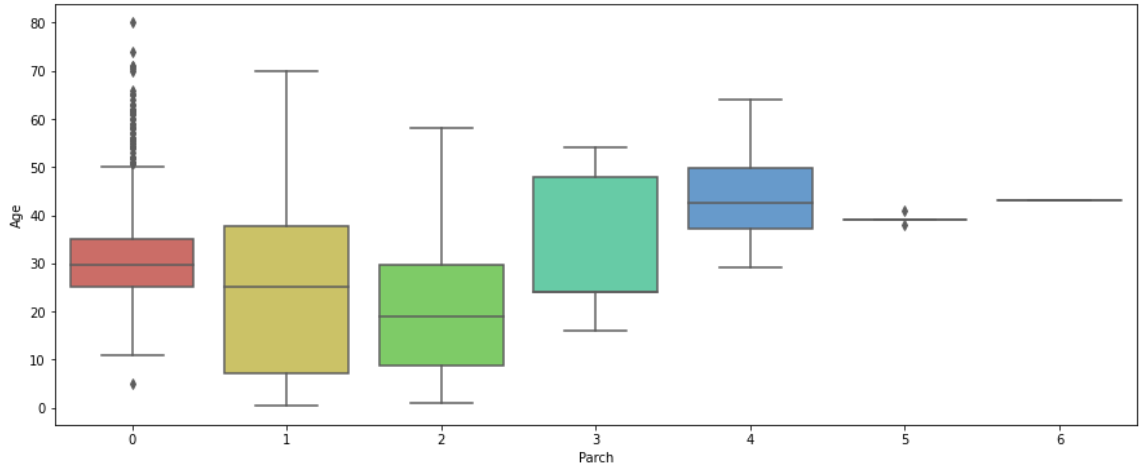
In [63]:

```
plt.figure(figsize=(15,6))
sns.scatterplot(x = df['Parch'], y = df['Age'] , data = df, palette = 'hls')
plt.show()
```



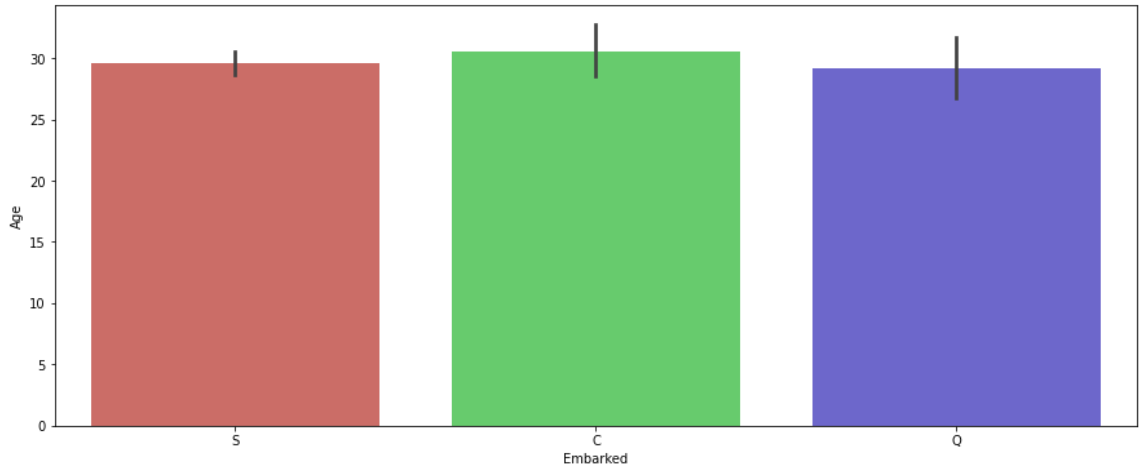
In [64]:

```
plt.figure(figsize=(15,6))
sns.boxplot(x = df['Parch'], y = df['Age'] , data = df, palette = 'hls')
plt.show()
```



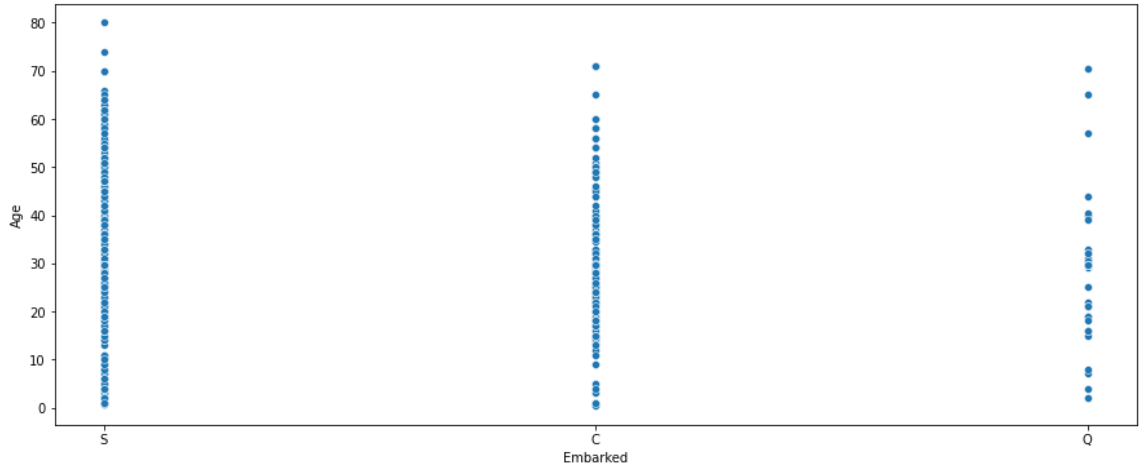
In [65]:

```
plt.figure(figsize=(15,6))
sns.barplot(x = df['Embarked'], y = df['Age'] , data = df, palette = 'hls')
plt.show()
```



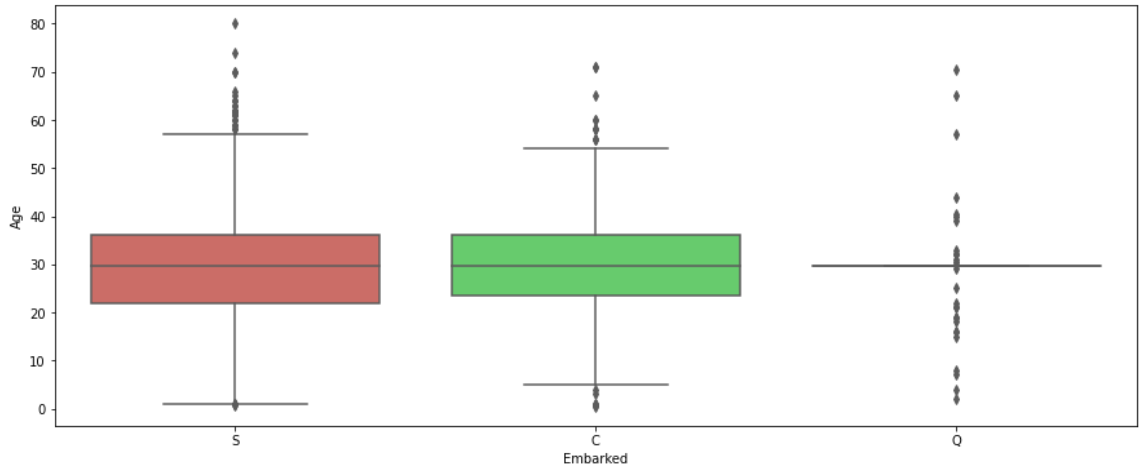
In [66]:

```
plt.figure(figsize=(15,6))
sns.scatterplot(x = df['Embarked'], y = df['Age'] , data = df, palette = 'hls')
plt.show()
```



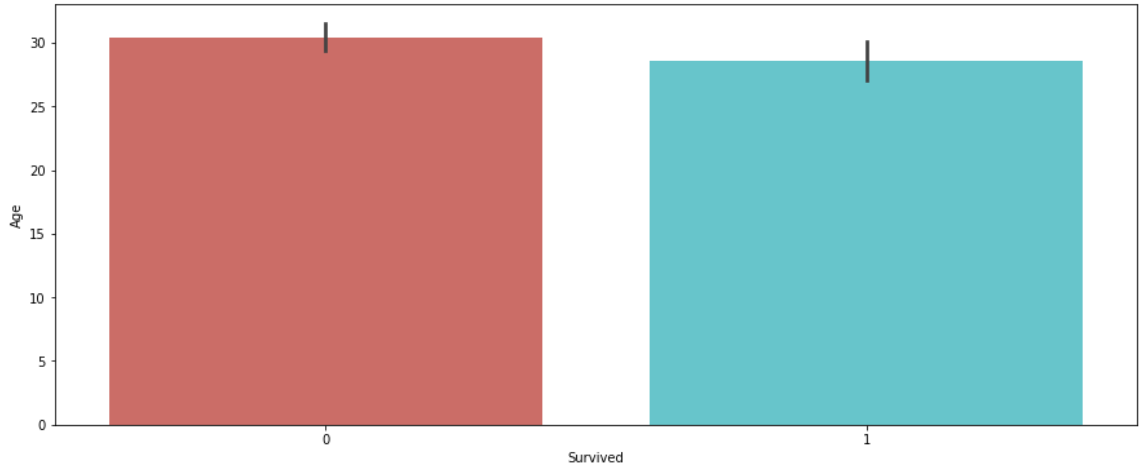
In [67]:

```
plt.figure(figsize=(15,6))
sns.boxplot(x = df['Embarked'], y = df['Age'] , data = df, palette = 'hls')
plt.show()
```



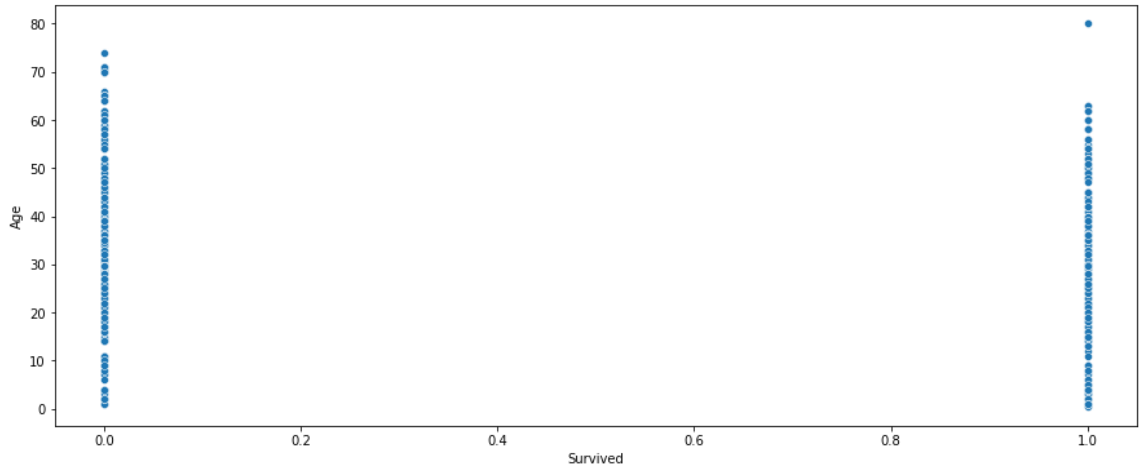
In [68]:

```
plt.figure(figsize=(15,6))
sns.barplot(y = df['Age'], x = df['Survived'] , data = df, palette = 'hls')
plt.show()
```



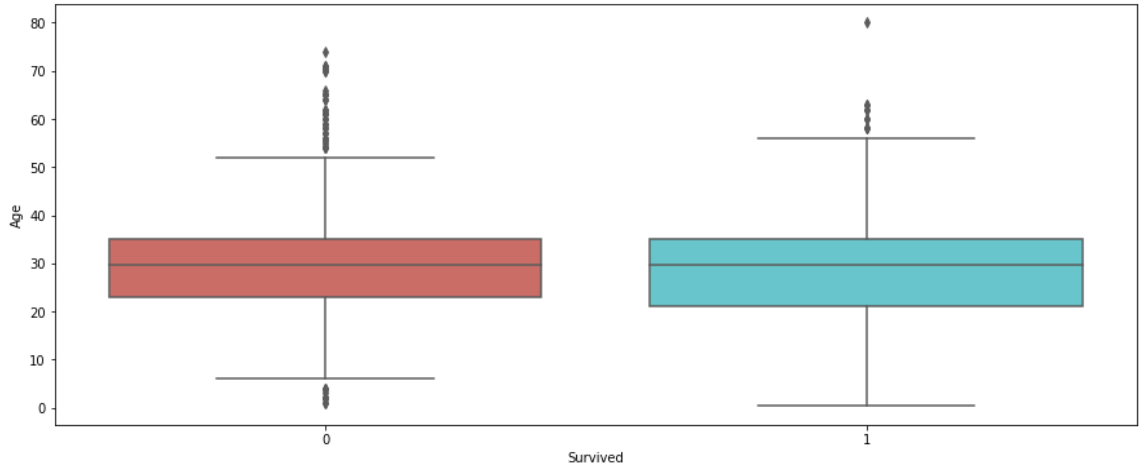
In [69]:

```
plt.figure(figsize=(15,6))
sns.scatterplot(y = df['Age'], x = df['Survived'] , data = df, palette = 'hls')
plt.show()
```



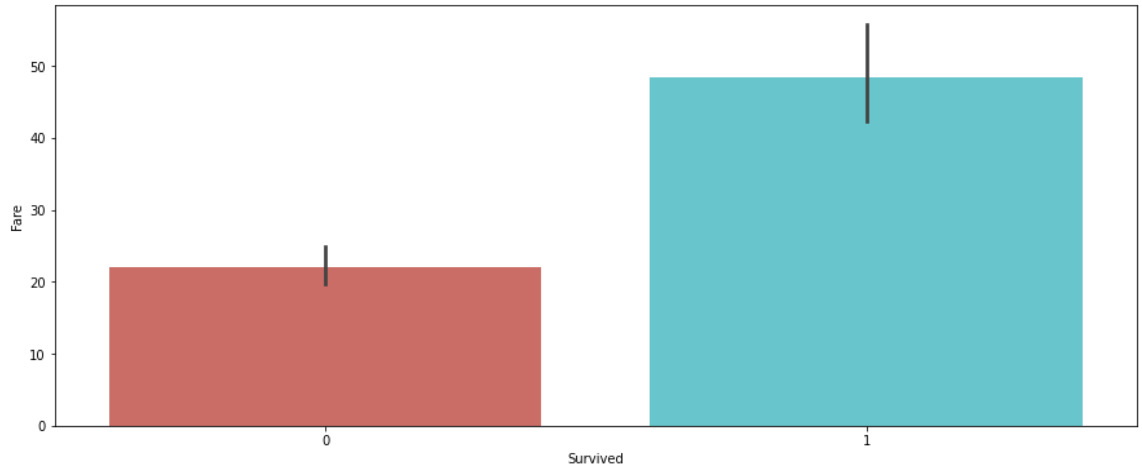
In [70]:

```
plt.figure(figsize=(15,6))
sns.boxplot(y = df['Age'], x = df['Survived'] , data = df, palette = 'hls')
plt.show()
```



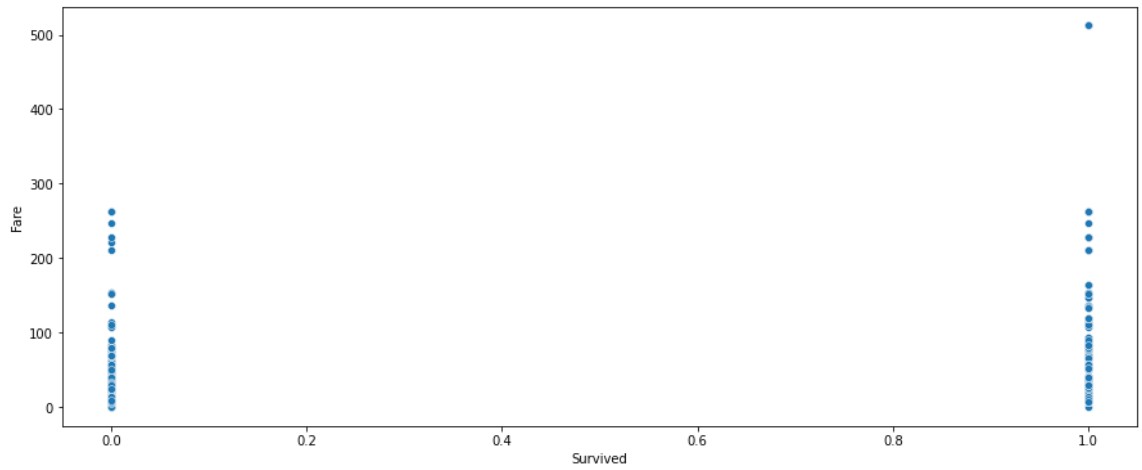
In [71]:

```
plt.figure(figsize=(15,6))
sns.barplot(y = df['Fare'], x = df['Survived'] , data = df, palette = 'hls')
plt.show()
```



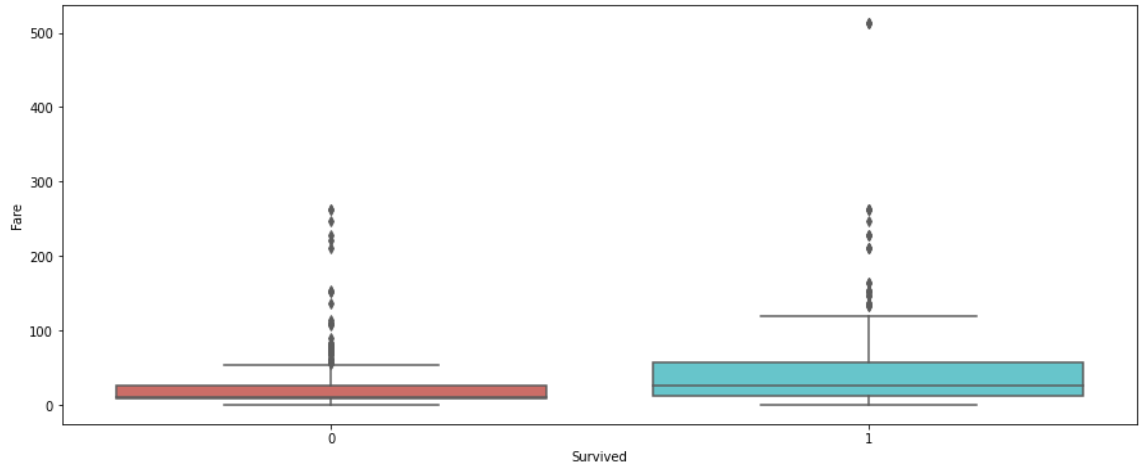
In [72]:

```
plt.figure(figsize=(15,6))
sns.scatterplot(y = df['Fare'], x = df['Survived'] , data = df, palette = 'hls')
plt.show()
```



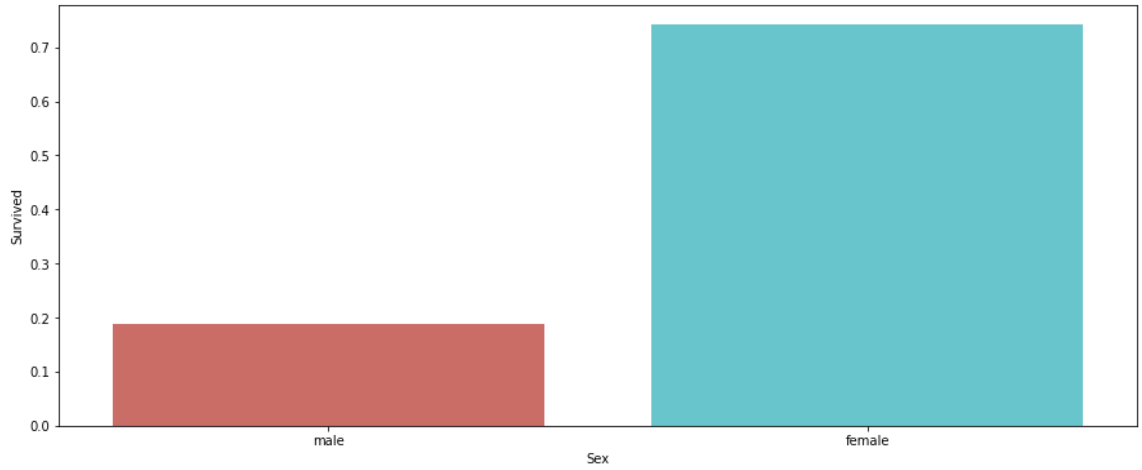
In [73]:

```
plt.figure(figsize=(15,6))
sns.boxplot(y = df['Fare'], x = df['Survived'] , data = df, palette = 'hls')
plt.show()
```



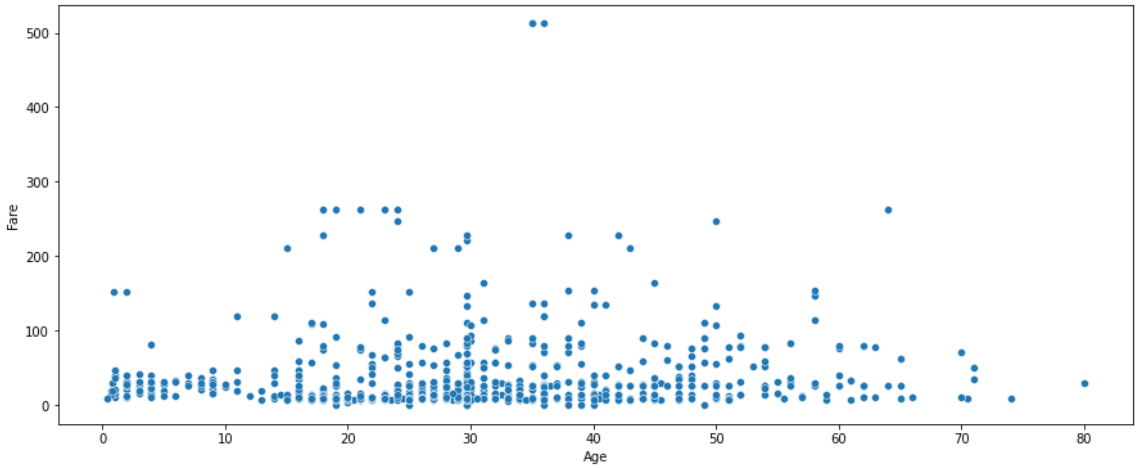
In [74]:

```
plt.figure(figsize=(15,6))
sns.barplot(x = df['Sex'], y = df['Survived'] , data = df, ci = None, palette = 'hls')
plt.show()
```



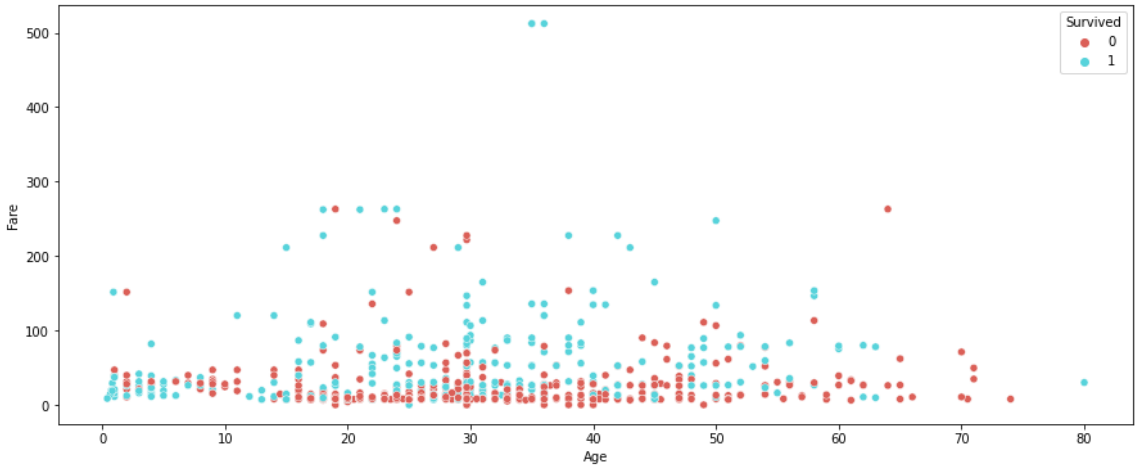
In [75]:

```
plt.figure(figsize=(15,6))
sns.scatterplot(x = df['Age'], y = df['Fare'] , data = df, palette = 'hls')
plt.show()
```



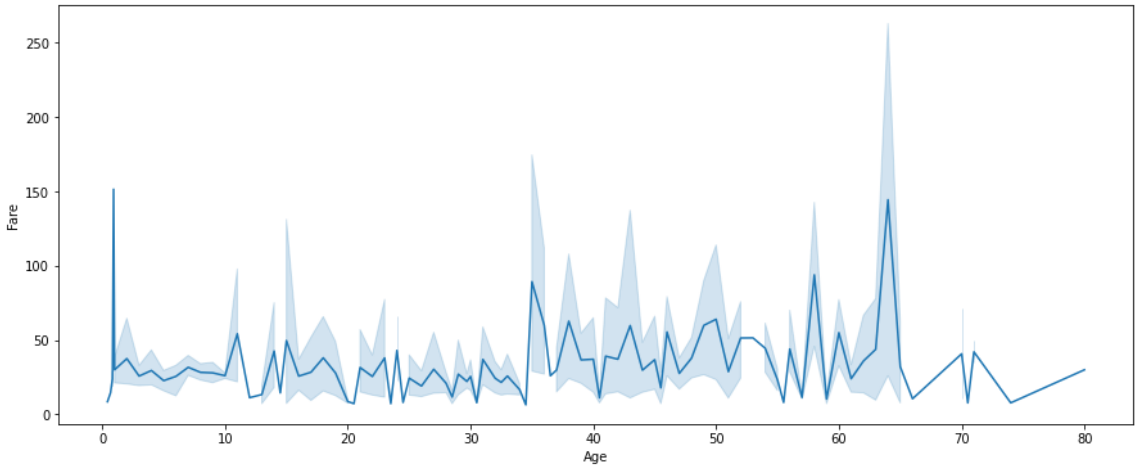
In [76]:

```
plt.figure(figsize=(15,6))
sns.scatterplot(x = df['Age'], y = df['Fare'] , hue = df['Survived'], data = df, palette
plt.show()
```



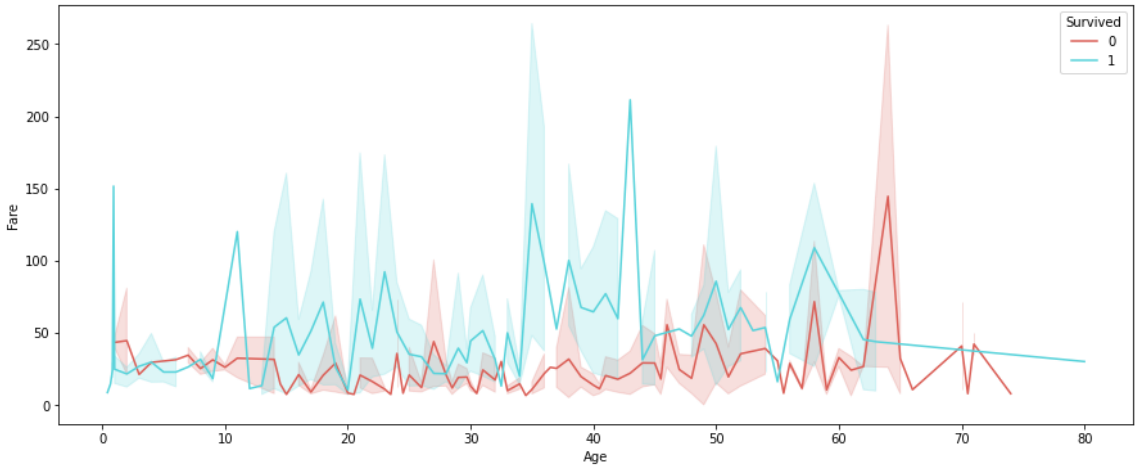
In [77]:

```
plt.figure(figsize=(15,6))
sns.lineplot(x = df['Age'], y = df['Fare'] , data = df, palette = 'hls')
plt.show()
```



In [78]:

```
plt.figure(figsize=(15,6))
sns.lineplot(x = df['Age'], y = df['Fare'] , hue = df['Survived'], data = df, palette =
plt.show()
```



In [79]:

```
pd.pivot_table(df, index = 'Survived', values = ['Age','SibSp','Parch','Fare'])
```

Out[79]:

Survived	Age	Fare	Parch	SibSp
0	30.415100	22.117887	0.329690	0.553734
1	28.549778	48.395408	0.464912	0.473684

In [80]:

```
import numpy as np
```

In [81]:

```
Pclass = df["Pclass"].value_counts(normalize=True)
Pclass = pd.DataFrame(Pclass)
Pclass = Pclass.reset_index()
Pclass = Pclass.rename(columns={"index":"Class", "Pclass":"% of passengers"})
Pclass = Pclass.sort_values(by='Class')
Pclass["% of passengers"]= Pclass["% of passengers"]*100
Pclass["% of passengers"]= np.round(Pclass["% of passengers"],2)
display(Pclass)
```

	Class	% of passengers
1	1	24.24
2	2	20.65
0	3	55.11

In [82]:

```
Ticket = df["Ticket"].value_counts(normalize=True)
Ticket = pd.DataFrame(Ticket)
Ticket = Ticket.reset_index()
Ticket = Ticket.rename(columns={"index":"Ticket", "Ticket":"% of passengers"})
Ticket["% of passengers"]= Ticket["% of passengers"]*100
Ticket["% of passengers"]= np.round(Ticket["% of passengers"],2)
display(Ticket)
```

	Ticket	% of passengers
0	347082	0.79
1	CA. 2343	0.79
2	1601	0.79
3	3101295	0.67
4	CA 2144	0.67
...	...	...
676	9234	0.11
677	19988	0.11
678	2693	0.11
679	PC 17612	0.11
680	370376	0.11

681 rows × 2 columns

In [83]:

```
Cabin = df["Cabin"].value_counts(normalize=True)
Cabin = pd.DataFrame(Cabin)
Cabin = Cabin.reset_index()
Cabin = Cabin.rename(columns={"index":"Cabin", "Cabin":"% of passengers"})
Cabin["% of passengers"]= Cabin["% of passengers"]*100
Cabin["% of passengers"]= np.round(Cabin["% of passengers"],2)
display(Cabin)
```

	Cabin	% of passengers
0	B96 B98	77.55
1	G6	0.45
2	C23 C25 C27	0.45
3	C22 C26	0.34
4	F33	0.34
...	...	...
142	E34	0.11
143	C7	0.11
144	C54	0.11
145	E36	0.11
146	C148	0.11

147 rows × 2 columns

In [84]:

```
df_new = df.copy()
```

In [85]:

```
df_new.groupby('Sex')['Age'].mean()
```

Out[85]:

```
Sex
female    28.216730
male      30.505824
Name: Age, dtype: float64
```

In [86]:

```
df = df.drop(['PassengerId', 'Name', 'Ticket', 'Cabin'], axis = 1)
```

In [87]:

```
df.head()
```

Out[87]:

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

In [88]:

```
from sklearn.preprocessing import LabelEncoder
encoder = LabelEncoder()
df['Sex'] = encoder.fit_transform(df['Sex'])
df['Embarked'] = encoder.fit_transform(df['Embarked'])
```

In [89]:

```
df.head()
```

Out[89]:

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

In [90]:

```
df_corr = df.corr()
```

In [91]:

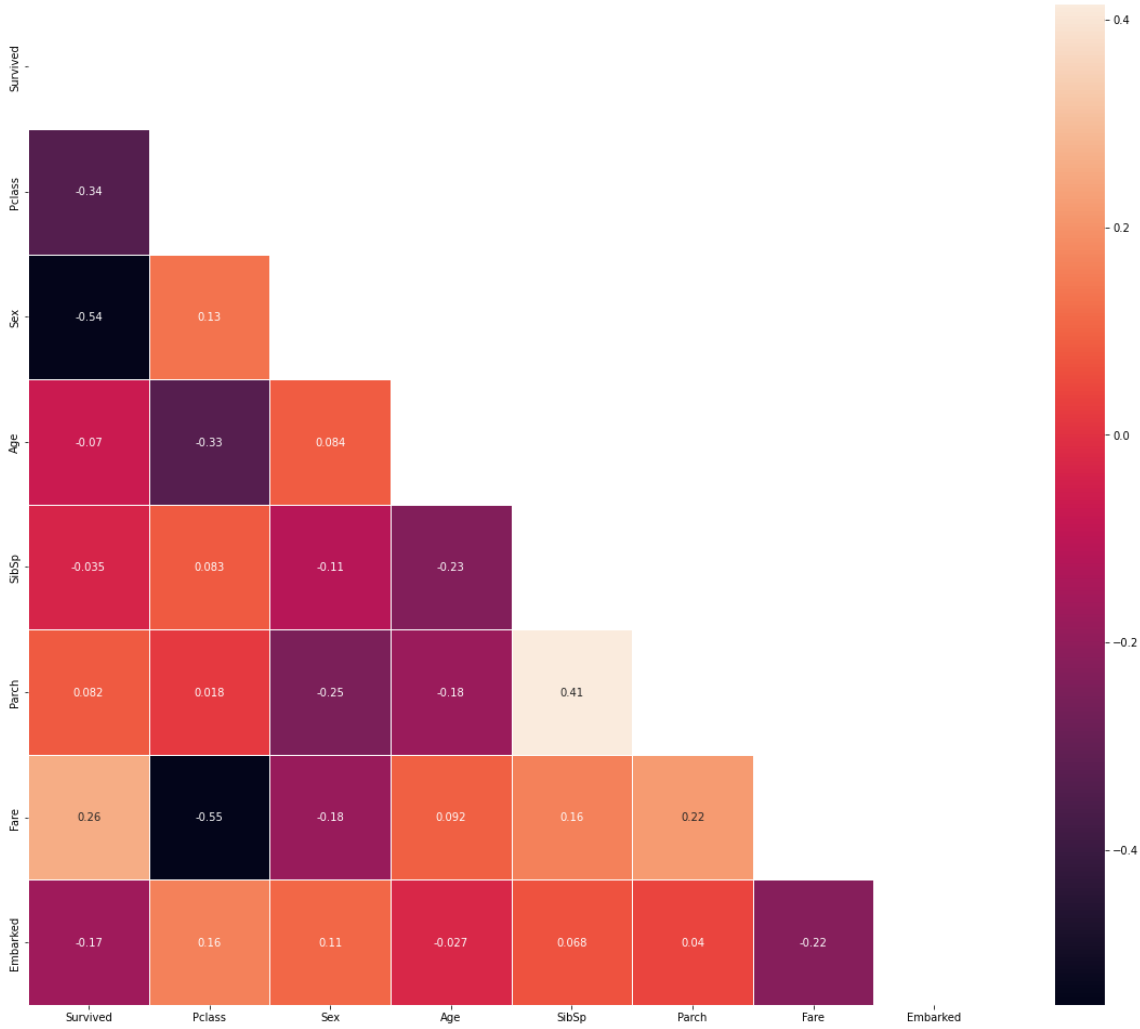
```
df_corr
```

Out[91]:

	Survived	Pclass	Sex	Age	SibSp	Parch	Fare	Embar
Survived	1.000000	-0.338481	-0.543351	-0.069809	-0.035322	0.081629	0.257307	-0.167
Pclass	-0.338481	1.000000	0.131900	-0.331339	0.083081	0.018443	-0.549500	0.162
Sex	-0.543351	0.131900	1.000000	0.084153	-0.114631	-0.245489	-0.182333	0.108
Age	-0.069809	-0.331339	0.084153	1.000000	-0.232625	-0.179191	0.091566	-0.026
SibSp	-0.035322	0.083081	-0.114631	-0.232625	1.000000	0.414838	0.159651	0.068
Parch	0.081629	0.018443	-0.245489	-0.179191	0.414838	1.000000	0.216225	0.039
Fare	0.257307	-0.549500	-0.182333	0.091566	0.159651	0.216225	1.000000	-0.224
Embarked	-0.167675	0.162098	0.108262	-0.026749	0.068230	0.039798	-0.224719	1.000

In [92]:

```
plt.figure(figsize=(20, 17))
matrix = np.triu(df_corr)
sns.heatmap(df_corr, annot=True, linewidth=.8, mask=matrix, cmap="rocket");
plt.show()
```

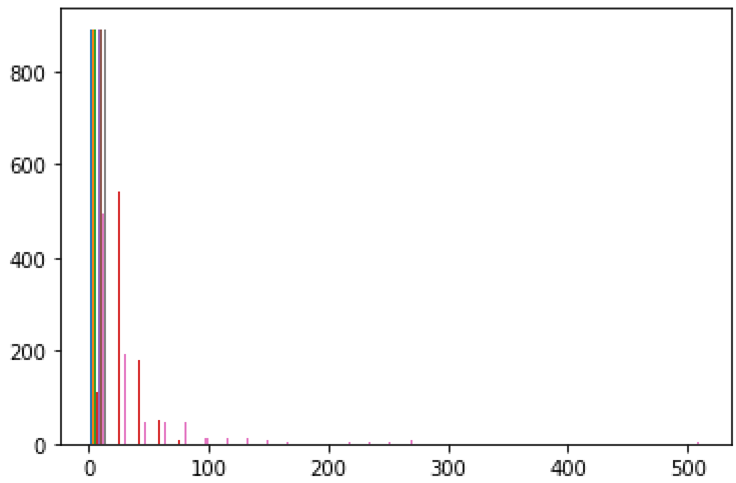


In [93]:

```
plt.hist(df, bins=30)
```

Out[93]:

```
(array([[891.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,
           0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,
           0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.],
        [891.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,
           0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,
           0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.],
        [891.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,
           0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,
           0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.],
        [113., 542., 179.,  50.,   7.,   0.,   0.,   0.,   0.,   0.,   0.,
           0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,
           0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.],
        [891.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,
           0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,
           0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.],
        [891.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,
           0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,
           0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.],
        [496., 191.,  45.,  45.,  48.,  13.,  11.,  11.,   9.,   2.,   0.,
           0.,   5.,   4.,   2.,   6.,   0.,   0.,   0.,   0.,   0.,   0.,
           0.,   0.,   0.,   0.,   0.,   0.,   0.,   3.],
        [891.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,
           0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.,
           0.,   0.,   0.,   0.,   0.,   0.,   0.,   0.]]),
 array([  0.      ,  17.07764,  34.15528,  51.23292,  68.31056,  85.3882 ,
        102.46584, 119.54348, 136.62112, 153.69876, 170.7764 , 187.85404,
        204.93168, 222.00932, 239.08696, 256.1646 , 273.24224, 290.31988,
        307.39752, 324.47516, 341.5528 , 358.63044, 375.70808, 392.78572,
        409.86336, 426.941   , 444.01864, 461.09628, 478.17392, 495.25156,
        512.3292 ]),
 <a list of 8 BarContainer objects>)
```



In [94]:

```
X = df.drop('Survived', axis=1)
y = df['Survived']
```

In [95]:

```
from sklearn.preprocessing import MinMaxScaler
scaler = MinMaxScaler()
X = scaler.fit_transform(X)
```

In [96]:

```
from sklearn.model_selection import train_test_split
```

In [97]:

```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.25, random_state=4
```

In [98]:

```
from sklearn.linear_model import LogisticRegression
logreg = LogisticRegression()
logreg.fit(X_train, y_train)
```

Out[98]:

```
LogisticRegression
LogisticRegression()
```

In [99]:

```
y_pred = logreg.predict(X_test)
```

In [100]:

```
from sklearn.metrics import accuracy_score, precision_score, recall_score, f1_score, con
```

In [101]:

```
# calculate accuracy
accuracy = accuracy_score(y_test, y_pred)

print(accuracy)

# calculate precision
precision = precision_score(y_test, y_pred)

print(precision)

# calculate recall
recall = recall_score(y_test, y_pred)

print(recall)

# calculate F1 score
f1 = f1_score(y_test, y_pred)

print(f1)

# calculate confusion matrix
cm = confusion_matrix(y_test, y_pred)

print(cm)

y_prob = logreg.predict_proba(X_test)
```

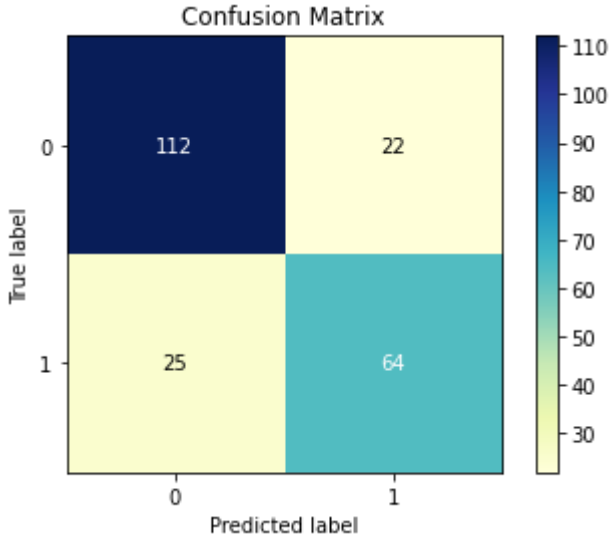
```
0.7892376681614349
0.7441860465116279
0.7191011235955056
0.7314285714285713
[[112  22]
 [ 25  64]]
```

In [102]:

```
from scikitplot.metrics import plot_confusion_matrix, plot_roc
```

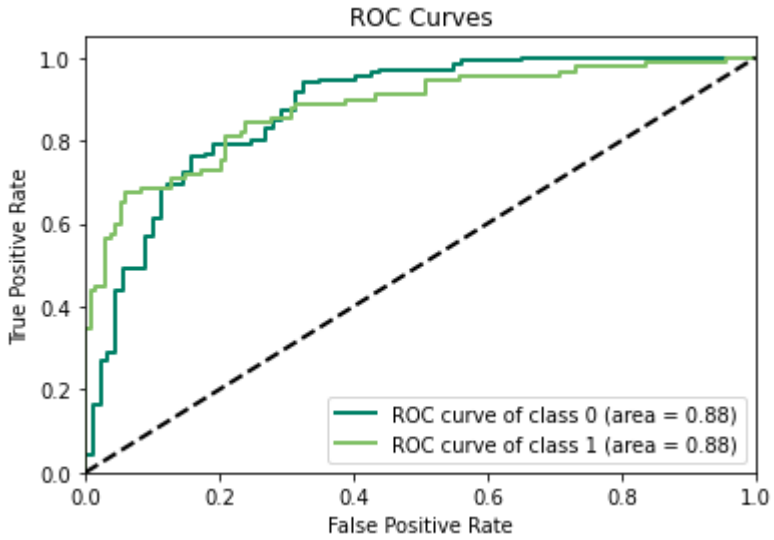
In [103]:

```
plot_confusion_matrix(y_test, y_pred, cmap= 'YlGnBu')
plt.show()
```



In [104]:

```
plot_roc(y_test, y_prob, plot_macro= False, plot_micro= False, cmap= 'summer')
plt.show()
```



In [105]:

```
from sklearn.tree import DecisionTreeClassifier
model = DecisionTreeClassifier()
model.fit(X_train,y_train)
```

Out[105]:

DecisionTreeClassifier

DecisionTreeClassifier()

In [106]:

```
y_pred = model.predict(X_test)
```

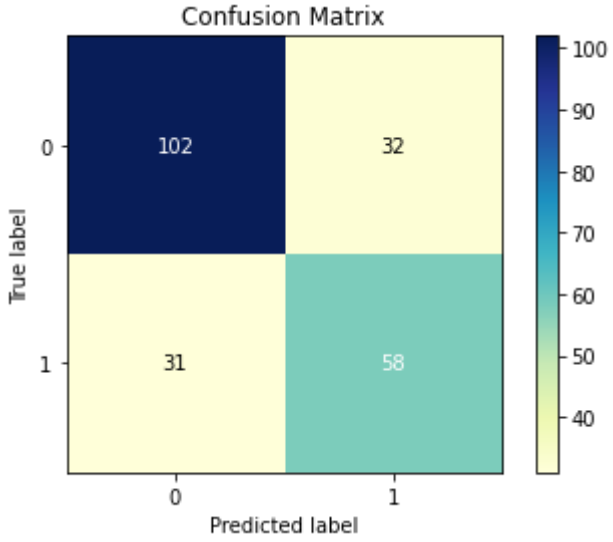
In [107]:

```
# calculate accuracy
accuracy = accuracy_score(y_test, y_pred)

print(accuracy)

# calculate precision
precision = precision_score(y_test, y_pred)

print(precision)

# calculate recall
recall = recall_score(y_test, y_pred)

print(recall)

# calculate F1 score
f1 = f1_score(y_test, y_pred)

print(f1)

# calculate confusion matrix
cm = confusion_matrix(y_test, y_pred)

print(cm)

y_prob = model.predict_proba(X_test)
```

```
0.7174887892376681
0.6444444444444445
0.651685393258427
0.6480446927374302
[[102  32]
 [ 31  58]]
```

In [108]:

```
plot_confusion_matrix(y_test, y_pred, cmap= 'YlGnBu')
plt.show()
```



In [109]:

```
plot_roc(y_test, y_prob, plot_macro= False, plot_micro= False, cmap= 'summer')
plt.show()
```