In [1]:
```
import numpy as np
import pandas as pd
from sklearn import preprocessing
import matplotlib.pyplot as plt
import seaborn as sns
sns.set(style="white")
sns.set(style="whitegrid",color_codes=True)
import warnings
warnings.simplefilter(action='ignore')
```

In [2]:
```
train_df=pd.read_csv(r"C:\Users\arshiha\Downloads\train.gender_submission.csv")
train_df
```

Out[2]:

| | 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

In [3]:
```
train_df.head()
```

Out[3]:

| | 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 [4]:
```
train_df.shape
```

Out[4]: (891, 12)

In [5]:
```
test_df=pd.read_csv(r"C:\Users\arshiha\Downloads\test.gender_submission.csv")
test_df
```

Out[5]:

| | PassengerId | Pclass | Name | Sex | Age | SibSp | Parch | Ticket | Fare | Cabin | Embarked |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 892 | 3 | Kelly, Mr. James | male | 34.5 | 0 | 0 | 330911 | 7.8292 | NaN | Q |
| **1** | 893 | 3 | Wilkes, Mrs. James (Ellen Needs) | female | 47.0 | 1 | 0 | 363272 | 7.0000 | NaN | S |
| **2** | 894 | 2 | Myles, Mr. Thomas Francis | male | 62.0 | 0 | 0 | 240276 | 9.6875 | NaN | Q |
| **3** | 895 | 3 | Wirz, Mr. Albert | male | 27.0 | 0 | 0 | 315154 | 8.6625 | NaN | S |
| **4** | 896 | 3 | Hirvonen, Mrs. Alexander (Helga E Lindqvist) | female | 22.0 | 1 | 1 | 3101298 | 12.2875 | NaN | S |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **413** | 1305 | 3 | Spector, Mr. Woolf | male | NaN | 0 | 0 | A.5. 3236 | 8.0500 | NaN | S |
| **414** | 1306 | 1 | Oliva y Ocana, Dona. Fermina | female | 39.0 | 0 | 0 | PC 17758 | 108.9000 | C105 | C |
| **415** | 1307 | 3 | Saether, Mr. Simon Sivertsen | male | 38.5 | 0 | 0 | SOTON/O.Q. 3101262 | 7.2500 | NaN | S |
| **416** | 1308 | 3 | Ware, Mr. Frederick | male | NaN | 0 | 0 | 359309 | 8.0500 | NaN | S |
| **417** | 1309 | 3 | Peter, Master. Michael J | male | NaN | 1 | 1 | 2668 | 22.3583 | NaN | C |

418 rows × 11 columns

In [6]:
```
test_df.head()
```

Out[6]:

| | PassengerId | Pclass | Name | Sex | Age | SibSp | Parch | Ticket | Fare | Cabin | Embarked |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 892 | 3 | Kelly, Mr. James | male | 34.5 | 0 | 0 | 330911 | 7.8292 | NaN | Q |
| **1** | 893 | 3 | Wilkes, Mrs. James (Ellen Needs) | female | 47.0 | 1 | 0 | 363272 | 7.0000 | NaN | S |
| **2** | 894 | 2 | Myles, Mr. Thomas Francis | male | 62.0 | 0 | 0 | 240276 | 9.6875 | NaN | Q |
| **3** | 895 | 3 | Wirz, Mr. Albert | male | 27.0 | 0 | 0 | 315154 | 8.6625 | NaN | S |
| **4** | 896 | 3 | Hirvonen, Mrs. Alexander (Helga E Lindqvist) | female | 22.0 | 1 | 1 | 3101298 | 12.2875 | NaN | S |

In [7]:
```
test_df.shape
```

Out[7]:
```
(418, 11)
```

In [8]:
```
train_df.describe
```

Out[8]:

```
<bound method NDFrame.describe of      PassengerId  Survived  Pclass  \
0              1         0       3
1              2         1       1
2              3         1       3
3              4         1       1
4              5         0       3
..           ...       ...     ...
886          887         0       2
887          888         1       1
888          889         0       3
889          890         1       1
890          891         0       3

                                                 Name     Sex   Age  SibSp  \
0                             Braund, Mr. Owen Harris    male  22.0      1
1    Cumings, Mrs. John Bradley (Florence Briggs Th...  female  38.0      1
2                              Heikkinen, Miss. Laina  female  26.0      0
3        Futrelle, Mrs. Jacques Heath (Lily May Peel)  female  35.0      1
4                            Allen, Mr. William Henry    male  35.0      0
..                                                ...     ...   ...    ...
886                            Montvila, Rev. Juozas    male  27.0      0
887                     Graham, Miss. Margaret Edith  female  19.0      0
888         Johnston, Miss. Catherine Helen "Carrie"  female   NaN      1
889                            Behr, Mr. Karl Howell    male  26.0      0
890                              Dooley, Mr. Patrick    male  32.0      0

     Parch            Ticket     Fare Cabin Embarked
0        0         A/5 21171   7.2500   NaN        S
1        0          PC 17599  71.2833   C85        C
2        0  STON/O2. 3101282   7.9250   NaN        S
3        0            113803  53.1000  C123        S
4        0            373450   8.0500   NaN        S
..     ...               ...      ...   ...      ...
886      0            211536  13.0000   NaN        S
887      0            112053  30.0000   B42        S
888      2        W./C. 6607  23.4500   NaN        S
889      0            111369  30.0000  C148        C
890      0            370376   7.7500   NaN        Q

[891 rows x 12 columns]>
```

In [9]:
```
train_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]:
```
test_df.describe
```

Out[10]:
```
<bound method NDFrame.describe of      PassengerId  Pclass                                          Name
0            892       3                              Kelly, Mr. James  \
1            893       3              Wilkes, Mrs. James (Ellen Needs)
2            894       2                     Myles, Mr. Thomas Francis
3            895       3                              Wirz, Mr. Albert
4            896       3  Hirvonen, Mrs. Alexander (Helga E Lindqvist)
..           ...     ...                                          ...
413         1305       3                           Spector, Mr. Woolf
414         1306       1                 Oliva y Ocana, Dona. Fermina
415         1307       3                 Saether, Mr. Simon Sivertsen
416         1308       3                          Ware, Mr. Frederick
417         1309       3                     Peter, Master. Michael J

        Sex   Age  SibSp  Parch              Ticket      Fare Cabin Embarked
0      male  34.5      0      0              330911    7.8292   NaN        Q
1    female  47.0      1      0              363272    7.0000   NaN        S
2      male  62.0      0      0              240276    9.6875   NaN        Q
3      male  27.0      0      0              315154    8.6625   NaN        S
4    female  22.0      1      1             3101298   12.2875   NaN        S
..      ...   ...    ...    ...                 ...       ...   ...      ...
413    male   NaN      0      0           A.5. 3236    8.0500   NaN        S
414  female  39.0      0      0            PC 17758  108.9000  C105        C
415    male  38.5      0      0  SOTON/O.Q. 3101262    7.2500   NaN        S
416    male   NaN      0      0              359309    8.0500   NaN        S
417    male   NaN      1      1                2668   22.3583   NaN        C

[418 rows x 11 columns]>
```

In [11]:
```
test_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 418 entries, 0 to 417
Data columns (total 11 columns):
 #   Column       Non-Null Count  Dtype  
---  ------       --------------  -----  
 0   PassengerId  418 non-null    int64  
 1   Pclass       418 non-null    int64  
 2   Name         418 non-null    object 
 3   Sex          418 non-null    object 
 4   Age          332 non-null    float64
 5   SibSp        418 non-null    int64  
 6   Parch        418 non-null    int64  
 7   Ticket       418 non-null    object 
 8   Fare         417 non-null    float64
 9   Cabin        91 non-null     object 
 10  Embarked     418 non-null    object 
dtypes: float64(2), int64(4), object(5)
memory usage: 36.1+ KB
```

In [12]:
```
train_df.isnull().sum()
```

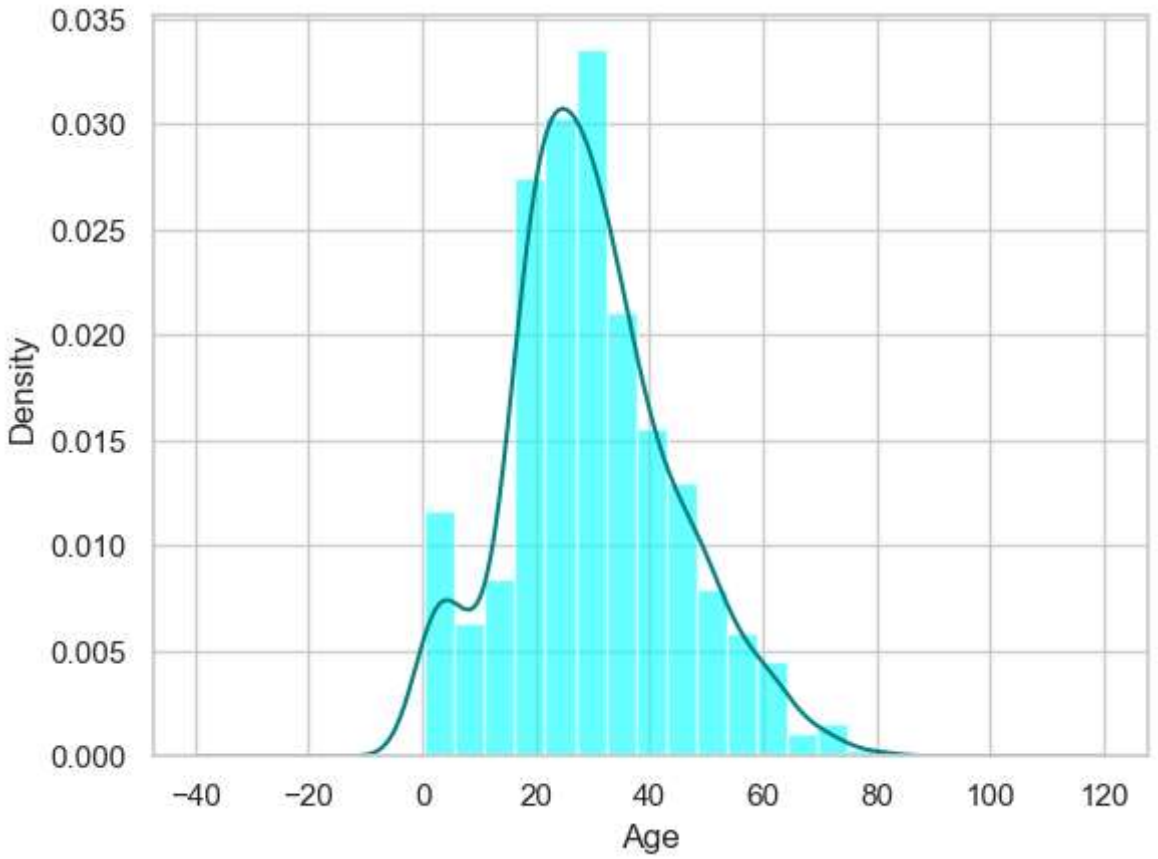
Out[12]:
```
PassengerId      0
Survived         0
Pclass           0
Name             0
Sex              0
Age            177
SibSp            0
Parch            0
Ticket           0
Fare             0
Cabin          687
Embarked         2
dtype: int64
```

In [13]:
```
test_df.isnull().sum()
```

Out[13]:
```
PassengerId      0
Pclass           0
Name             0
Sex              0
Age             86
SibSp            0
Parch            0
Ticket           0
Fare             1
Cabin          327
Embarked         0
dtype: int64
```

In [14]:
```
ax=train_df["Age"].hist(bins=15,density=True,stacked=True,color='cyan',alpha=0.6)
train_df["Age"].plot(kind='density',color='teal')
ax.set(xlabel='Age')
```

Out[14]:
```
[Text(0.5, 0, 'Age')]
```




In [15]:
```
print(train_df["Age"].mean(skipna=True))
print(train_df["Age"].median(skipna=True))
```

```
29.69911764705882
28.0
```

In [16]:
```
print((train_df['Cabin'].isnull().sum()/train_df.shape[0])*100)
```

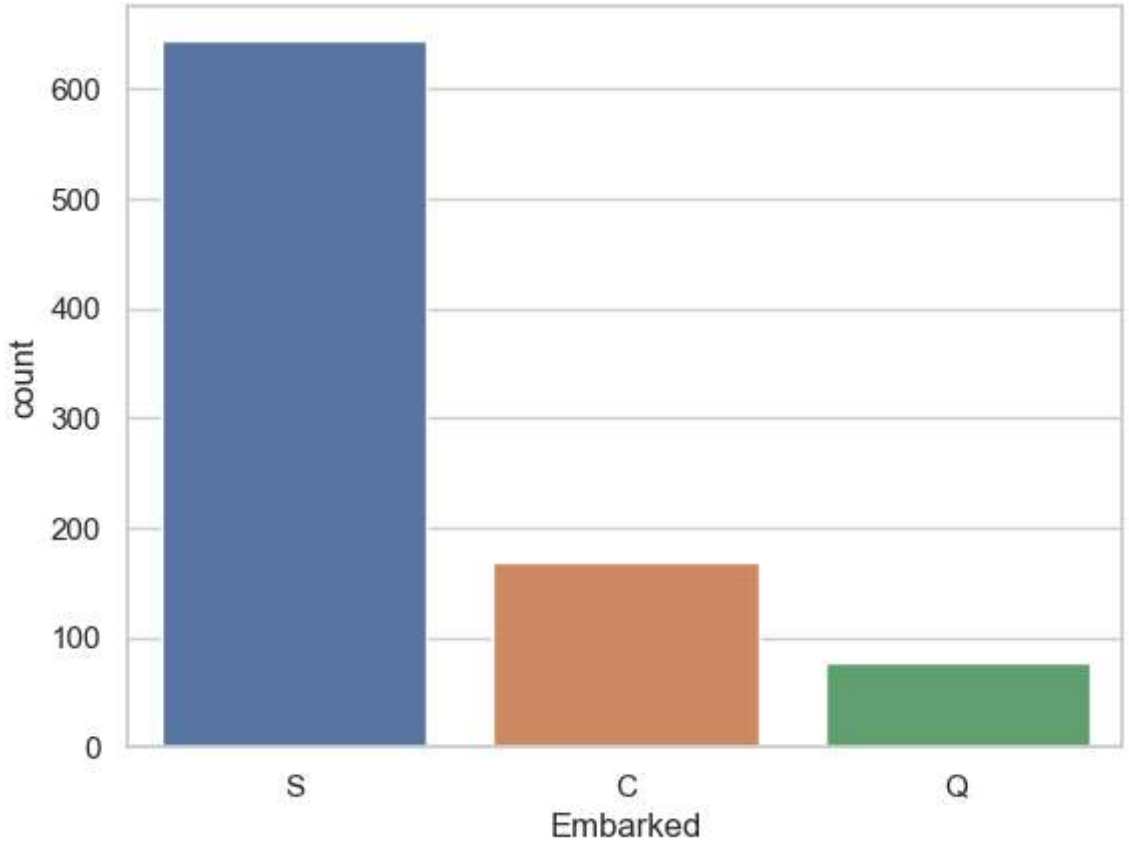
```
77.10437710437711
```

In [17]:
```
print((train_df['Embarked'].isnull().sum()/train_df.shape[0])*100)
```

```
0.22446689113355783
```

In [18]:
```
print('Boarded Passengers grounded by port of embarkation(C=Cherbourg,Q=Queenstown,S=Southampton)')
print(train_df['Embarked'].value_counts(1))
sns.countplot(x='Embarked',data=train_df,palette=None)
plt.show()
```

```
Boarded Passengers grounded by port of embarkation(C=Cherbourg,Q=Queenstown,S=Southampton)
Embarked
S    0.724409
C    0.188976
Q    0.086614
Name: proportion, dtype: float64
```



In [19]:
```
print(train_df['Embarked'].value_counts().idxmax())
```

```
S
```

In [20]:
```
train_data=train_df.copy()
train_data["Age"].fillna(train_df["Age"].median(skipna=True),inplace=True)
train_data["Embarked"].fillna(train_df["Embarked"].value_counts().idxmax(),inplace=True)
train_data.drop('Cabin',axis=1,inplace=True)
```

In [21]:
```
train_df.isnull().sum()
```

Out[21]:
```
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 [22]:
```
train_data.isnull().sum()
```

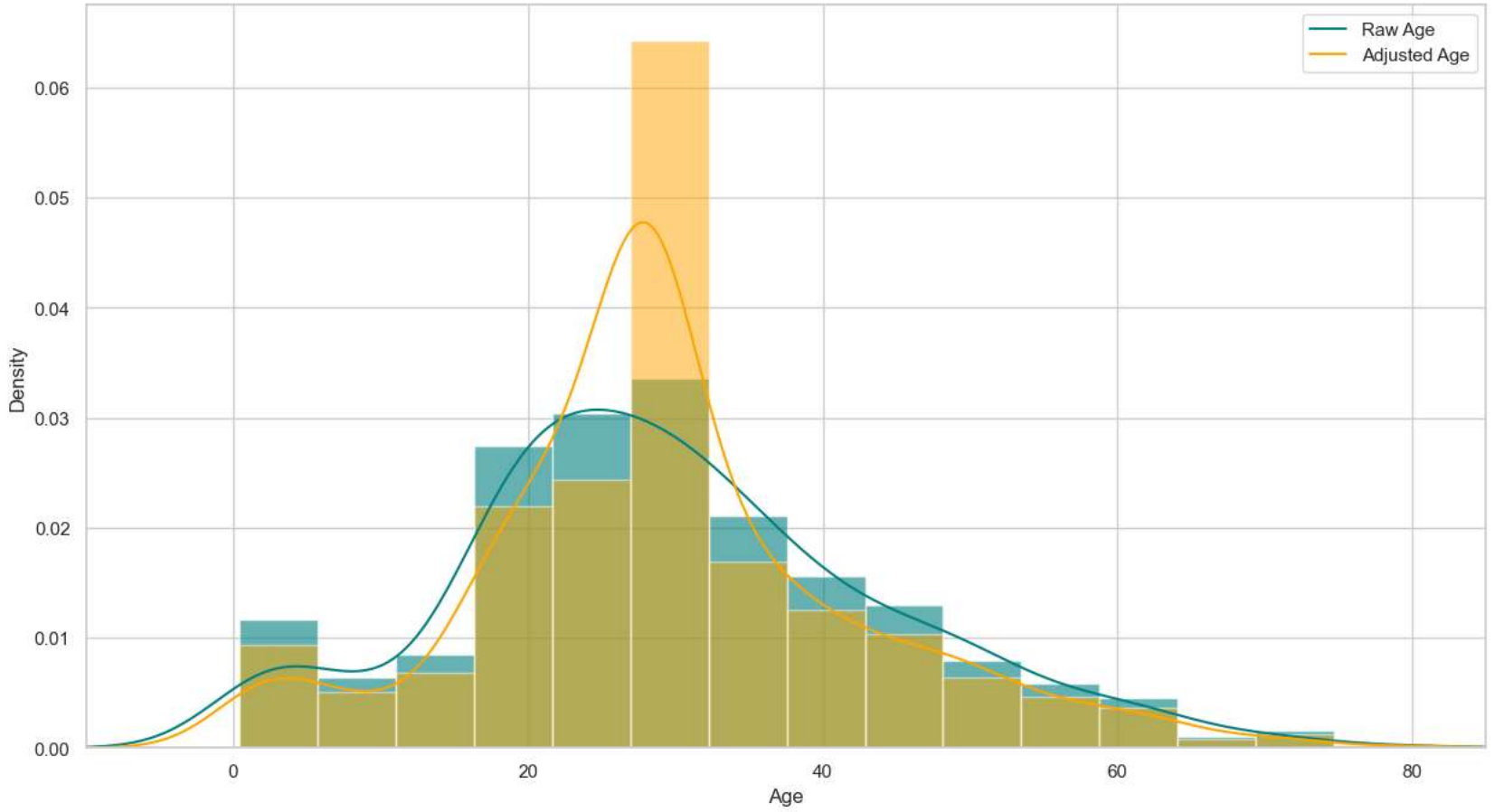
Out[22]:
```
PassengerId    0
Survived       0
Pclass         0
Name           0
Sex            0
Age            0
SibSp          0
Parch          0
Ticket         0
Fare           0
Embarked       0
dtype: int64
```

In [23]:
```
train_data.head()
```

Out[23]:

| | 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 |

In [24]:
```
plt.figure(figsize=(15,8))
ax=train_df["Age"].hist(bins=15,density=True,stacked=True,color='teal',alpha=0.6)
train_df["Age"].plot(kind='density',color='teal')
ax=train_data["Age"].hist(bins=15,density=True,stacked=True,color='orange',alpha=0.5)
train_data["Age"].plot(kind='density',color='orange')
ax.legend(['Raw Age','Adjusted Age'])
ax.set(xlabel='Age')
plt.xlim(-10,85)
plt.show()
```



In [25]:
```
train_data['Travel Alone']=np.where((train_data["SibSp"]+train_data["Parch"])>0,0,1)
train_data.drop('SibSp',axis=1,inplace=True)
train_data.drop('Parch',axis=1,inplace=True)
```

In [26]:
```
training=pd.get_dummies(train_data,columns=["Pclass","Embarked","Sex"])
training.drop('Sex_female',axis=1,inplace=True)
training.drop('PassengerId',axis=1,inplace=True)
training.drop('Name',axis=1,inplace=True)
training.drop('Ticket',axis=1,inplace=True)
final_train=training
final_train.head()
```

Out[26]:

| | Survived | Age | Fare | Travel Alone | Pclass_1 | Pclass_2 | Pclass_3 | Embarked_C | Embarked_Q | Embarked_S | Sex_male |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 0 | 22.0 | 7.2500 | 0 | False | False | True | False | False | True | True |
| **1** | 1 | 38.0 | 71.2833 | 0 | True | False | False | True | False | False | False |
| **2** | 1 | 26.0 | 7.9250 | 1 | False | False | True | False | False | True | False |
| **3** | 1 | 35.0 | 53.1000 | 0 | True | False | False | False | False | True | False |
| **4** | 0 | 35.0 | 8.0500 | 1 | False | False | True | False | False | True | True |

In [27]:
```
test_df.isnull().sum()
```

Out[27]:
```
PassengerId      0
Pclass           0
Name             0
Sex              0
Age             86
SibSp            0
Parch            0
Ticket           0
Fare             1
Cabin          327
Embarked         0
dtype: int64
```

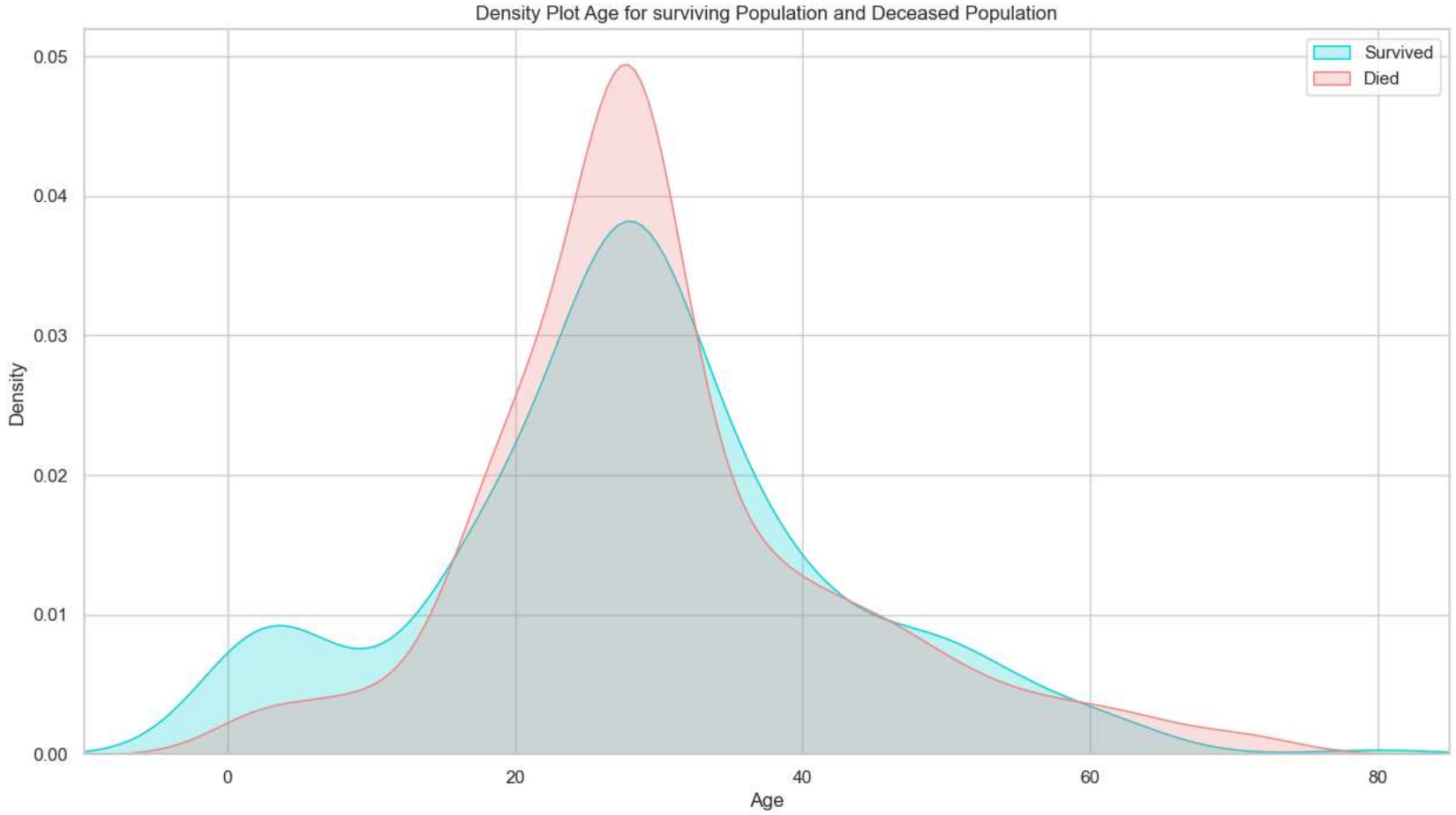
In [28]:
```
test_data=test_df.copy()
test_data["Age"].fillna(train_df["Age"].median(skipna=True),inplace=True)
test_data["Fare"].fillna(train_df["Fare"].median(skipna=True),inplace=True)
test_data.drop('Cabin',axis=1,inplace=True)
test_data['TravelAlone']=np.where((test_data['SibSp']+test_data['Parch'])>0, 0, 1)
test_data.drop('SibSp',axis=1,inplace=True)
test_data.drop('Parch',axis=1,inplace=True)
testing=pd.get_dummies(test_data,columns=['Pclass','Embarked','Sex'])
testing.drop('Sex_female',axis=1,inplace=True)
testing.drop('PassengerId',axis=1,inplace=True)
testing.drop('Name',axis=1,inplace=True)
testing.drop('Ticket',axis=1,inplace=True)
final_test=testing
final_test.head()
```

Out[28]:

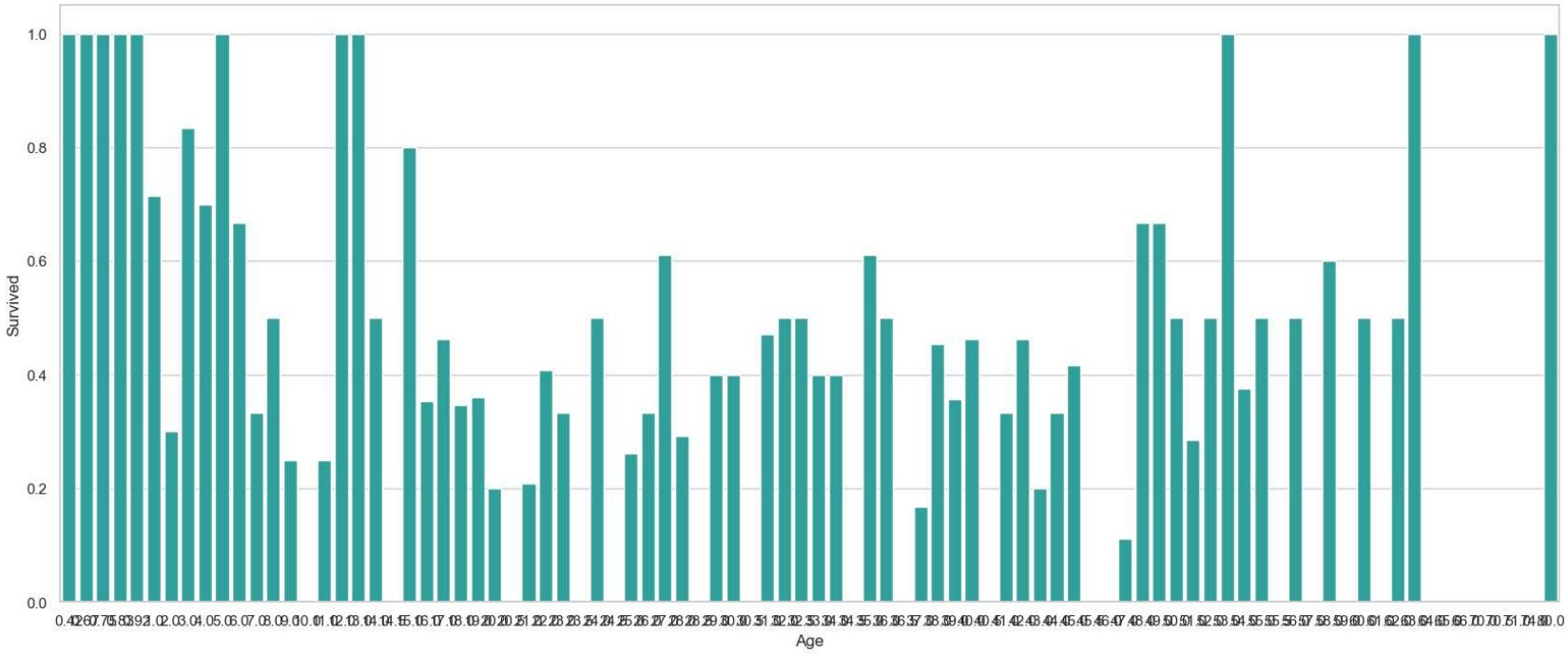
| | Age | Fare | TravelAlone | Pclass_1 | Pclass_2 | Pclass_3 | Embarked_C | Embarked_Q | Embarked_S | Sex_male |
|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 34.5 | 7.8292 | 1 | False | False | True | False | True | False | True |
| **1** | 47.0 | 7.0000 | 0 | False | False | True | False | False | True | False |
| **2** | 62.0 | 9.6875 | 1 | False | True | False | False | True | False | True |
| **3** | 27.0 | 8.6625 | 1 | False | False | True | False | False | True | True |
| **4** | 22.0 | 12.2875 | 0 | False | False | True | False | False | True | False |

# EXPLORATORY DATA ANALYSIS

In [29]:
```
plt.figure(figsize=(15,8))
ax=sns.kdeplot(final_train['Age'][final_train.Survived==1],color="darkturquoise",shade=True)
sns.kdeplot(final_train['Age'][final_train.Survived==0],color="lightcoral",shade=True)
plt.legend(['Survived','Died'])
plt.title('Density Plot Age for surviving Population and Deceased Population')
ax.set(xlabel='Age')
plt.xlim(-10,85)
plt.show()
```



In [30]:
```
plt.figure(figsize=(20,8))
avg_survival_byage = final_train[['Age', "Survived"]].groupby(['Age'],as_index=False).mean()
g=sns.barplot(x='Age', y='Survived', data=avg_survival_byage, color="LightSeaGreen")
plt.show()
```



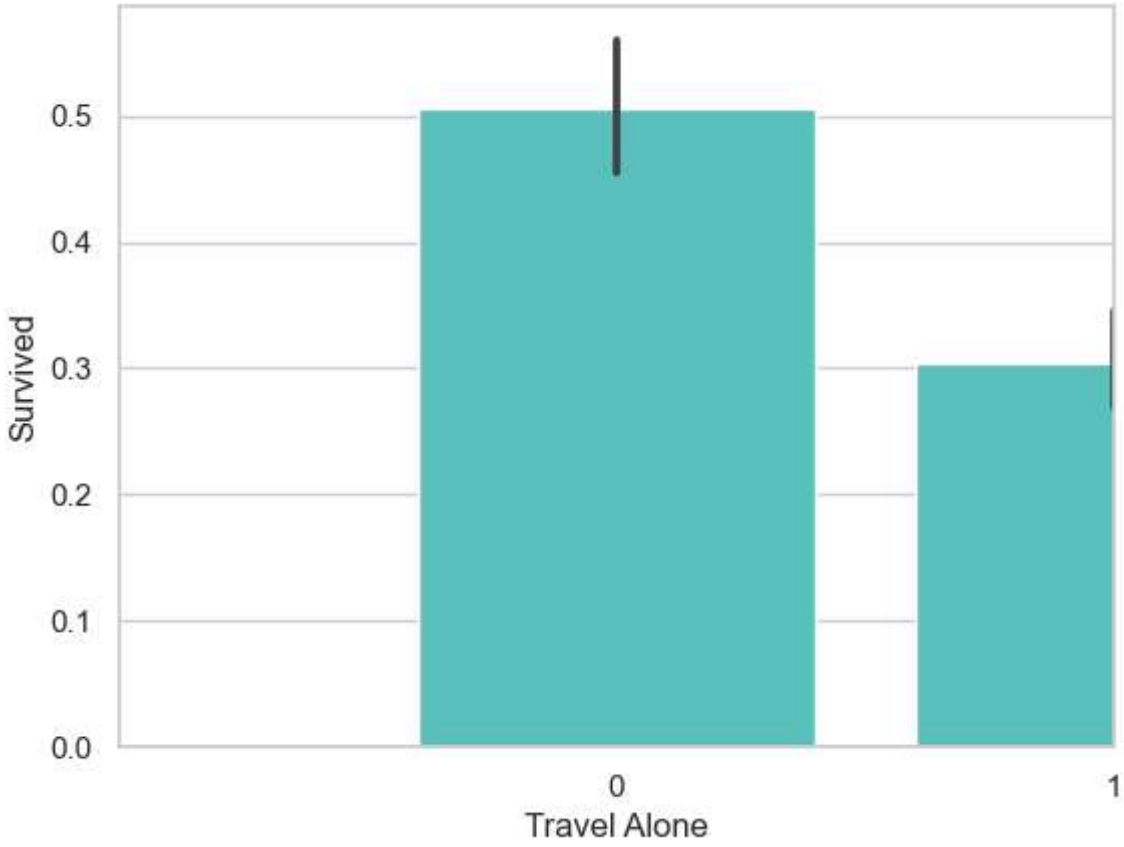
In [31]:
```
final_train['IsMinor']=np.where(final_train['Age']<=16, 1, 0)
print(final_train['IsMinor'])
```

```
0      0
1      0
2      0
3      0
4      0
      ..
886    0
887    0
888    0
889    0
890    0
Name: IsMinor, Length: 891, dtype: int32
```

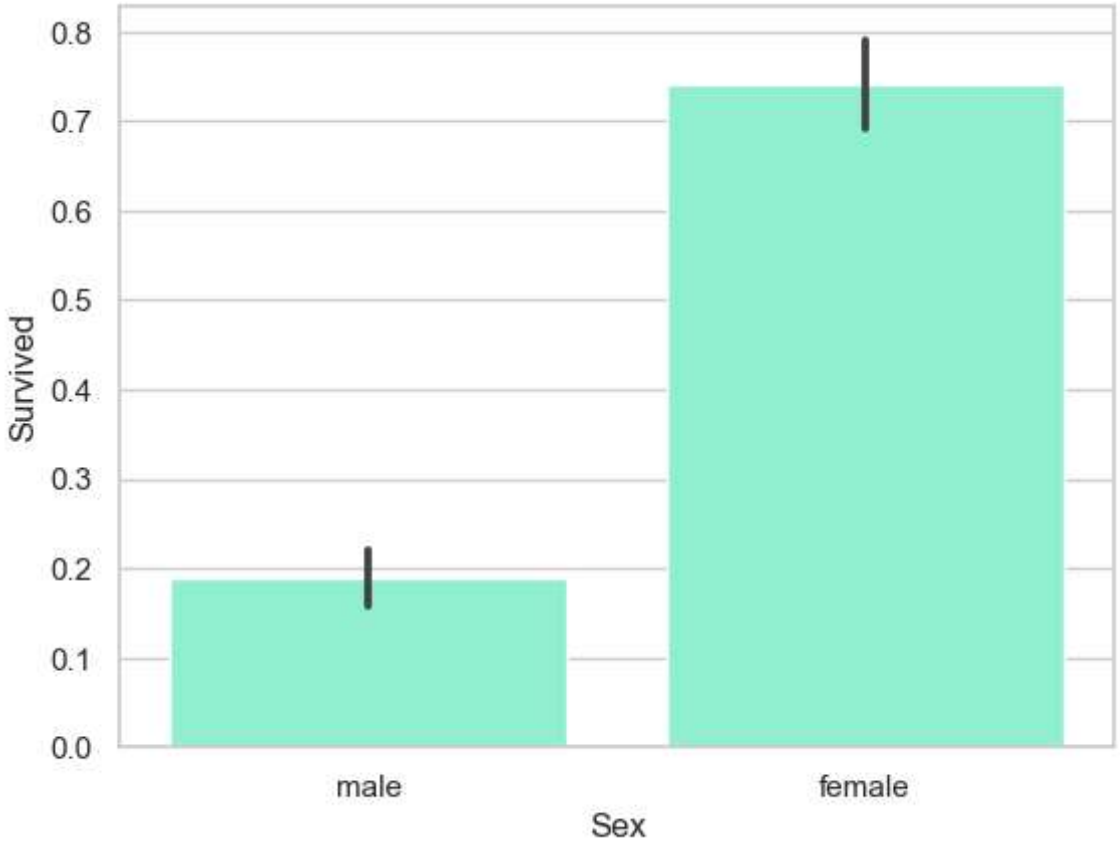
In [32]:
```
final_test['IsMinor']=np.where(final_test['Age']<=16, 1, 0)
print(final_test['IsMinor'])
```

```
0      0
1      0
2      0
3      0
4      0
      ..
413    0
414    0
415    0
416    0
417    0
Name: IsMinor, Length: 418, dtype: int32
```

In [34]:
```
sns.barplot(x='Travel Alone',y='Survived', data=final_train, color="mediumturquoise")
plt.xlim(-1,1)
plt.show()
```



In [35]:
```
import seaborn as sns
import matplotlib.pyplot as plt
sns.barplot(x='Sex', y='Survived', data=train_df, color='aquamarine')
plt.show()
```




In [ ]: