Problem Statement

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\HP\Downloads\train.gender_submission.csv")
train_df
```

Out[2]:

	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
...	...	...	...	...	...	...	...	...	...	...
886	887	0	2	Montvila, Rev. Juozas	male	27.0	0	0	211536	13.0000
887	888	1	1	Graham, Miss. Margaret Edith	female	19.0	0	0	112053	30.0000
888	889	0	3	Johnston, Miss. Catherine Helen "Carrie"	female	NaN	1	2	W./C. 6607	23.4500
889	890	1	1	Behr, Mr. Karl Howell	male	26.0	0	0	111369	30.0000
890	891	0	3	Dooley, Mr. Patrick	male	32.0	0	0	370376	7.7500

891 rows × 12 columns

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

Out[3]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Ca
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	C
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	

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

Out[4]:
```
(891, 12)
```

In [5]:

```
test_df=pd.read_csv(r"C:\Users\HP\Downloads\test.gender_submission.csv")
test_df
```

Out[5]:

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

418 rows × 11 columns

In [6]:

```
test_df.head()
```

Out[6]:

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

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: 36.0+ KB
```

To Find Missing Values

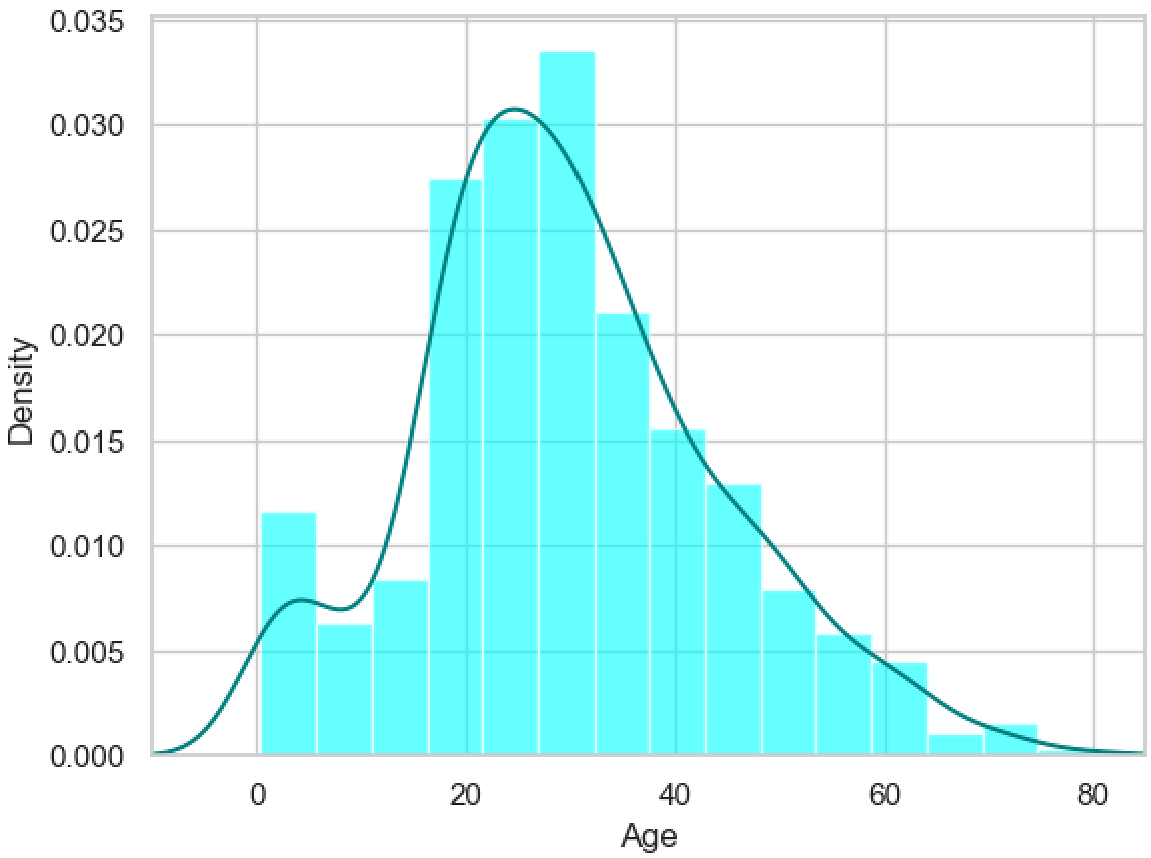
In [12]:
```
test_df.isnull().sum
```

Out[12]:
```
<bound method NDFrame._add_numeric_operations.<locals>.sum of      Passenger
Id  Pclass    Name    Sex    Age  SibSp  Parch  Ticket   Fare  
0          False   False  False  False  False  False  False   False  False   
\
1          False   False  False  False  False  False  False   False  False   
2          False   False  False  False  False  False  False   False  False   
3          False   False  False  False  False  False  False   False  False   
4          False   False  False  False  False  False  False   False  False   
..           ...     ...    ...    ...    ...    ...    ...     ...    ...   
413        False   False  False  False   True  False  False   False  False   
414        False   False  False  False  False  False  False   False  False   
415        False   False  False  False  False  False  False   False  False   
416        False   False  False  False   True  False  False   False  False   
417        False   False  False  False   True  False  False   False  False   

     Cabin  Embarked  
0     True     False  
1     True     False  
2     True     False  
3     True     False  
4     True     False  
..     ...       ...  
413   True     False  
414  False     False  
415   True     False  
416   True     False  
417   True     False  

[418 rows x 11 columns]>
```

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

Out[13]:
```
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 [14]: ax=train_df["Age"].hist(bins=15,density=True,stacked=True,color='cyan',alpha=
         train_df["Age"].plot(kind='density',color='teal')
         ax.set(xlabel='Age')
         plt.xlim(-10,85)
         plt.show()
```



```
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
```

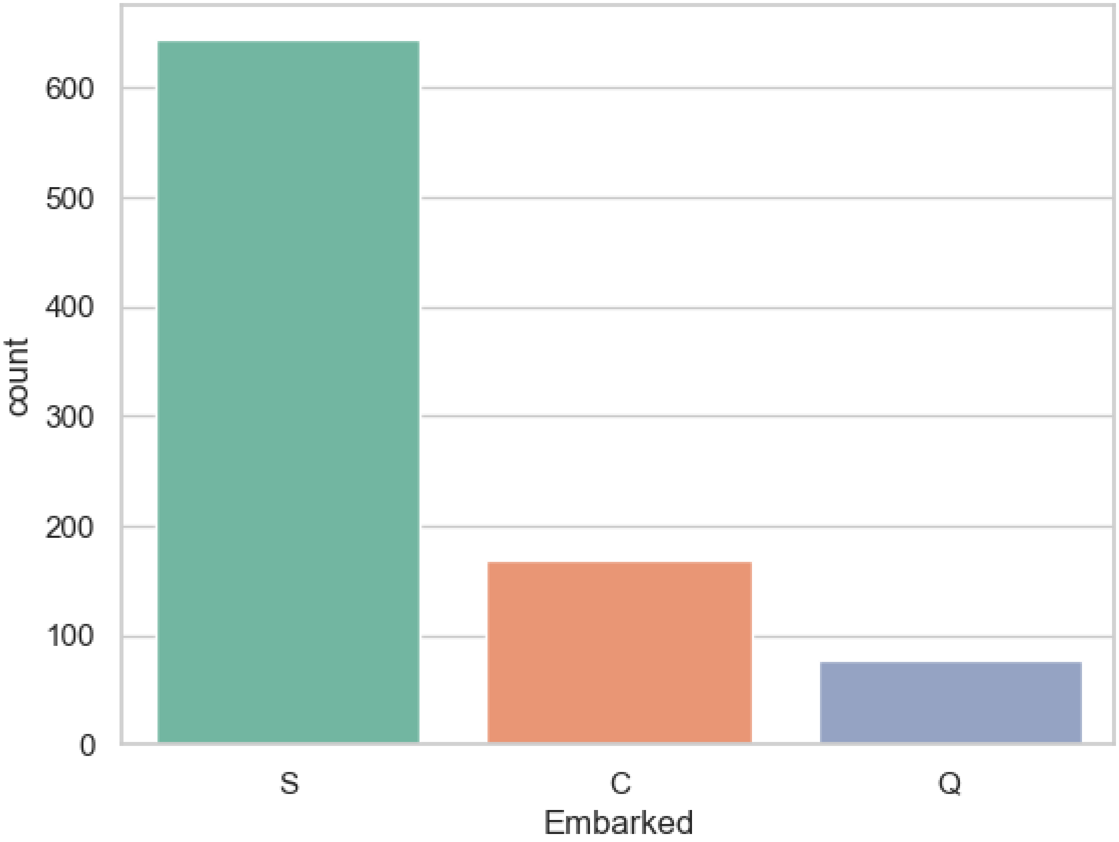
```
In [17]: print((train_df['Embarked'].isnull().sum()/train_df.shape[0])*100)
```

```
0.22446689113355783
```

In [18]:

```
print('Bosreded passengers grouped by port of embarkation(C=Cherbourg,Q=Queens
print(train_df['Embarked'].value_counts())
sns.countplot(x='Embarked',data=train_df,palette='Set2')
plt.show()
```

```
Bosreded passengers grouped by port of embarkation(C=Cherbourg,Q=Queenstown,
S=Southampton):
Embarked
S    644
C    168
Q     77
Name: count, dtype: int64
```



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(),inp
train_data.drop('Cabin',axis=1,inplace=True)
```

In [21]:

```
train_data.isnull().sum()
```

Out[21]:

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

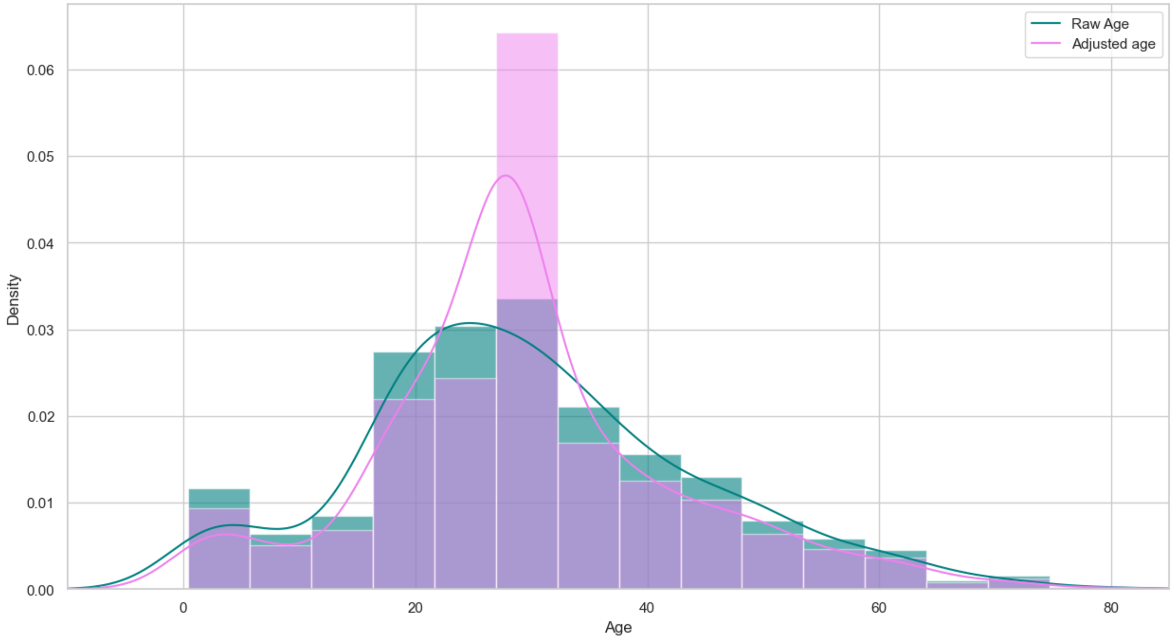
In [22]:

```
train_data.head()
```

Out[22]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	E
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 [23]:
```
plt.figure(figsize=(15,8))
ax=train_df["Age"].hist(bins=15,density=True,stacked=True,color='teal',alpha=
train_df["Age"].plot(kind='density',color='teal')
ax=train_data["Age"].hist(bins=15,density=True,stacked=True,color='violet',alp
train_data["Age"].plot(kind='density',color='violet')
ax.legend(['Raw Age','Adjusted age'])
ax.set(xlabel='Age')
plt.xlim(-10,85)
plt.show()
```



In [24]:
```
train_data['TravelAlone']=np.where((train_data["SibSp"]+train_data["Parch"])>
train_data.drop('SibSp',axis=1,inplace=True)
train_data.drop('Parch',axis=1,inplace=True)
```

In [25]:

```
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[25]:

	Survived	Age	Fare	TravelAlone	Pclass_1	Pclass_2	Pclass_3	Embarked_C	Embarked_
0	0	22.0	7.2500	0	False	False	True	False	Fal
1	1	38.0	71.2833	0	True	False	False	True	Fal
2	1	26.0	7.9250	1	False	False	True	False	Fal
3	1	35.0	53.1000	0	True	False	False	False	Fal
4	0	35.0	8.0500	1	False	False	True	False	Fal

In [26]:

```
test_df.isnull().sum()
```

Out[26]:

```
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 [27]:

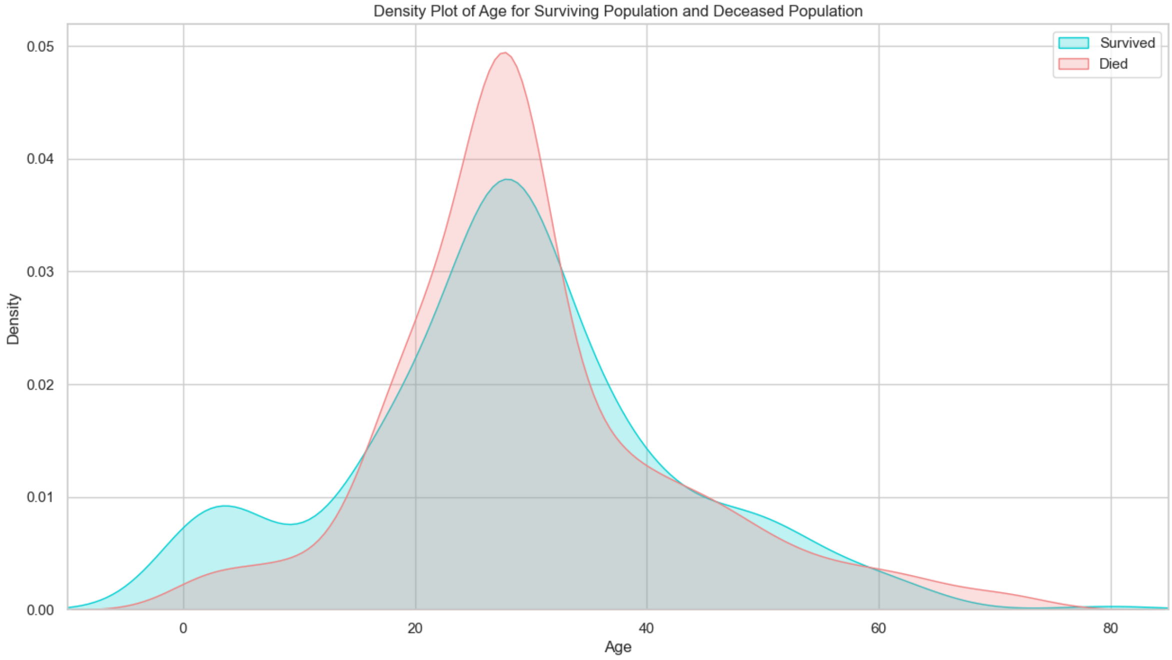
```
test_data=test_df.copy()
test_data["Age"].fillna(test_df["Age"].median(skipna=True),inplace=True)
test_data["Fare"].fillna(test_df["Fare"].median(skipna=True),inplace=True)
test_data.drop('Cabin',axis=1,inplace=True)
test_data['TravelAlone']=np.where((test_data["SibSp"]+test_data["Parch"])>0,0,
test_data.drop('SibSp',axis=1,inplace=True)
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[27]:

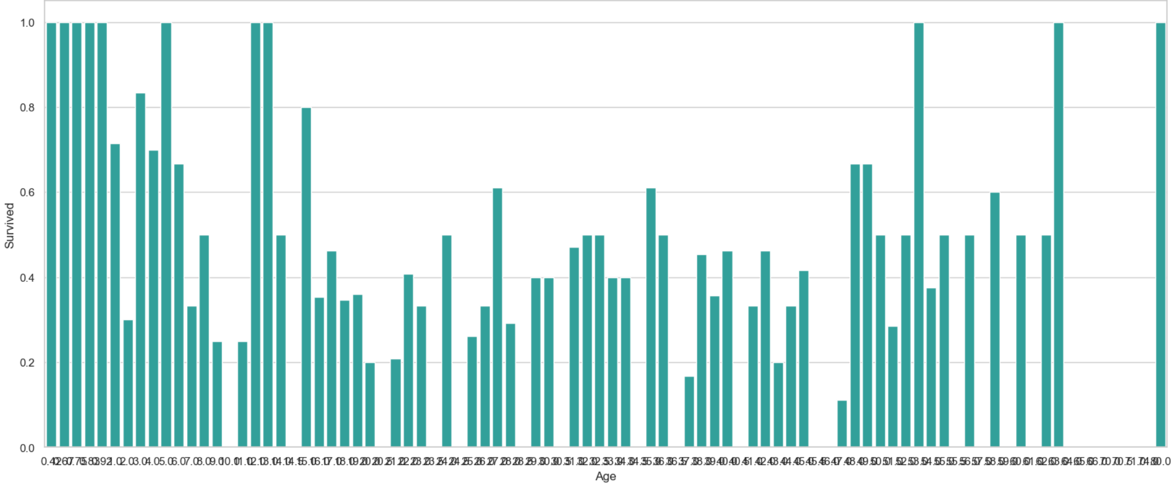
	Age	Fare	TravelAlone	Pclass_1	Pclass_2	Pclass_3	Embarked_C	Embarked_Q	Embarl
0	34.5	7.8292	1	False	False	True	False	True	
1	47.0	7.0000	0	False	False	True	False	False	
2	62.0	9.6875	1	False	True	False	False	True	
3	27.0	8.6625	1	False	False	True	False	False	
4	22.0	12.2875	0	False	False	True	False	False	

Exploratary Data Analysis

In [28]:
```
plt.figure(figsize=(15,8))
ax = sns.kdeplot(final_train["Age"][final_train.Survived == 1], color="darktur
sns.kdeplot(final_train["Age"][final_train.Survived == 0], color="lightcoral",
plt.legend(['Survived', 'Died'])
plt.title('Density Plot of Age for Surviving Population and Deceased Populatio
ax.set(xlabel='Age')
plt.xlim(-10,85)
plt.show()
```



In [29]:
```
plt.figure(figsize=(20,8))
avg_survival_byage = final_train[["Age", "Survived"]].groupby(['Age'], as_inde
g = sns.barplot(x='Age', y='Survived', data=avg_survival_byage, color="LightSe
plt.show()
```



In [30]:

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

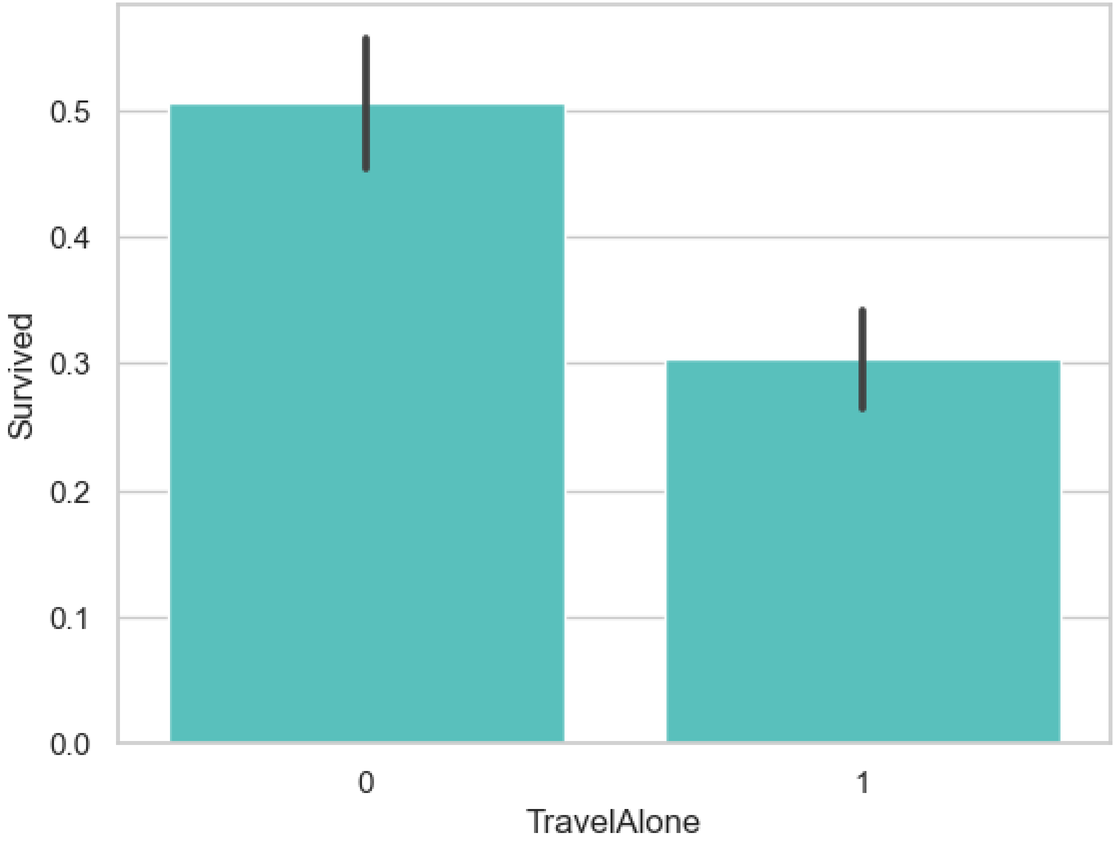
```
0      0
1      0
2      0
3      0
4      0
      ..
886    0
887    0
888    0
889    0
890    0
Name: IsMinor, Length: 891, dtype: int32
```

In [31]:

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

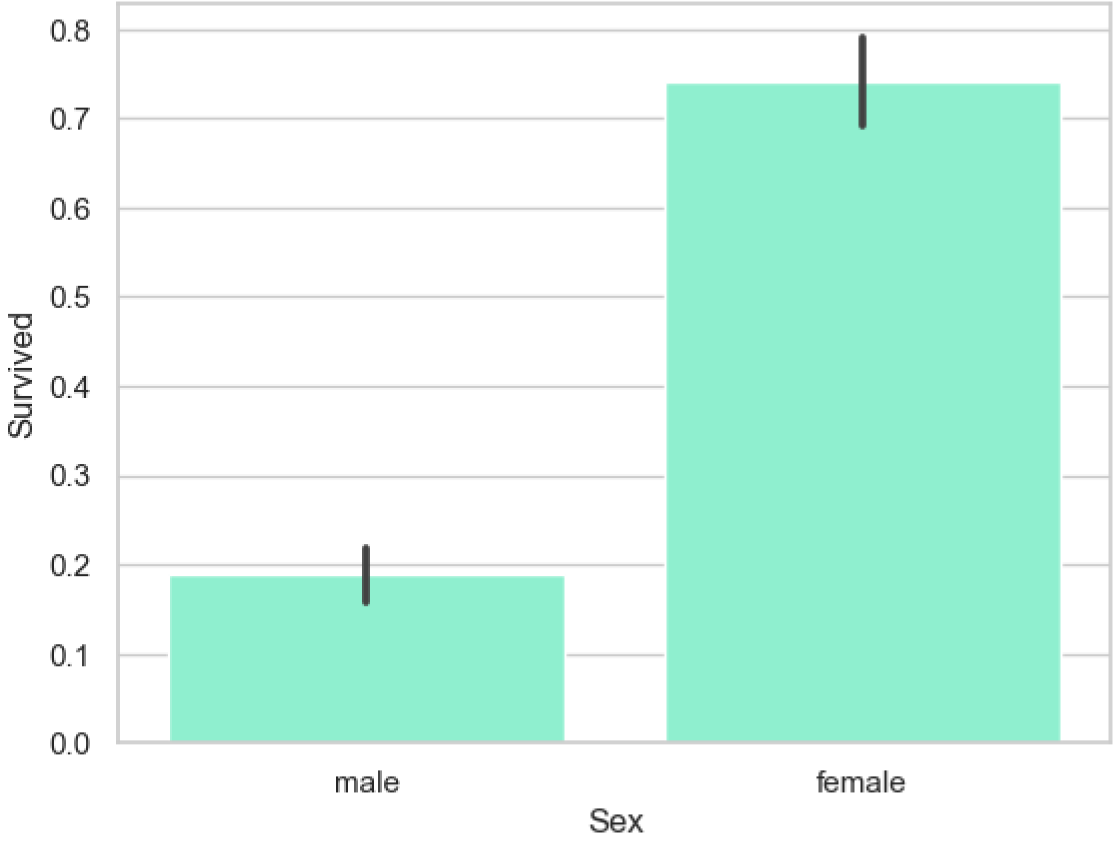
```
0      0
1      0
2      0
3      0
4      0
      ..
413    0
414    0
415    0
416    0
417    0
Name: IsMinor, Length: 418, dtype: int32
```

In [32]:
```
sns.barplot(x='TravelAlone', y='Survived', data=final_train, color="mediumturq
plt.show()
```



In [33]:

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



In [ ]:

```
```