PROBLEM STATEMENT: To Predict And Analyze

Which Gender Has A High Chance Of Survival At The Time Of Disaster

In [47]:

```
#IMPORT DATASETS,PYTHON PACKAGES AND LIBRARIES
import numpy as np
import pandas as pd
from sklearn import preprocessing
import matplotlib.pyplot as plt
# plt.rc("font",size=14)
import seaborn as sns
sns.set(style="white") #White background style for seaborn plots
sns.set(style="whitegrid", color_codes=True)
import warnings
warnings.simplefilter(action='ignore')
```

In [4]:

```
train_df = pd.read_csv(r"C:\Users\Teju\Downloads\train.gender_submission.csv")
train_df
```

Out[4]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fa
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.25
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.28
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.92
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.10
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.05
...	...	...	...	...	...	...	...	...	...	
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
890	891	0	3	Dooley, Mr. Patrick	male	32.0	0	0	370376	7.75

891 rows × 12 columns

In [5]:

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

Out[5]:

	PassengerId	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cab
0	892	3	Kelly, Mr. James	male	34.5	0	0	330911	7.8292	N
1	893	3	Wilkes, Mrs. James (Ellen Needs)	female	47.0	1	0	363272	7.0000	N
2	894	2	Myles, Mr. Thomas Francis	male	62.0	0	0	240276	9.6875	N
3	895	3	Wirz, Mr. Albert	male	27.0	0	0	315154	8.6625	N
4	896	3	Hirvonen, Mrs. Alexander (Helga E Lindqvist)	female	22.0	1	1	3101298	12.2875	N
...	...	...	...	...	...	...	...	...	...	
413	1305	3	Spector, Mr. Woolf	male	NaN	0	0	A.5. 3236	8.0500	N
414	1306	1	Oliva y Ocana, Dona. Fermina	female	39.0	0	0	PC 17758	108.9000	C1
415	1307	3	Saether, Mr. Simon Sivertsen	male	38.5	0	0	SOTON/O.Q. 3101262	7.2500	N
416	1308	3	Ware, Mr. Frederick	male	NaN	0	0	359309	8.0500	N
417	1309	3	Peter, Master. Michael J	male	NaN	1	1	2668	22.3583	N

418 rows × 11 columns

In [7]:

```
train_df.shape
```

Out[7]:

```
(891, 12)
```

In [9]:

```
test_df.head()
```

Out[9]:

	PassengerId	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Em
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 [10]:

```
test_df.shape
```

Out[10]:

```
(418, 11)
```

In [12]:

```
train_df.describe
```

Out[12]:

```
<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  SibS
p  \
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 [13]:

```
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 [14]:

```
test_df.describe
```

Out[14]:

```
<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 Embark
ed
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 [15]:

```
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 [16]:

```
train_df.isnull().sum()
```

Out[16]:

```
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 [17]:

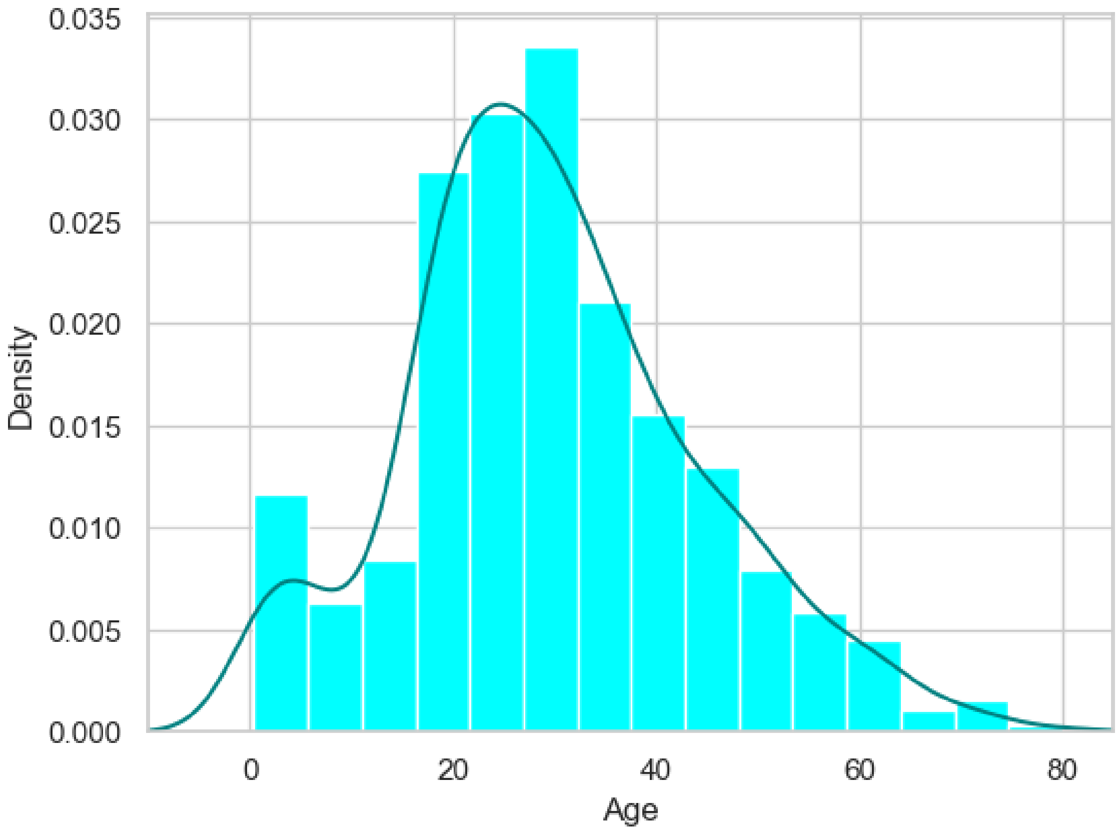
```
test_df.isnull().sum()
```

Out[17]:

```
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 [18]:

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



In [19]:

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

```
29.69911764705882
28.0
```

In [20]:

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

```
77.10437710437711
```

In [21]:

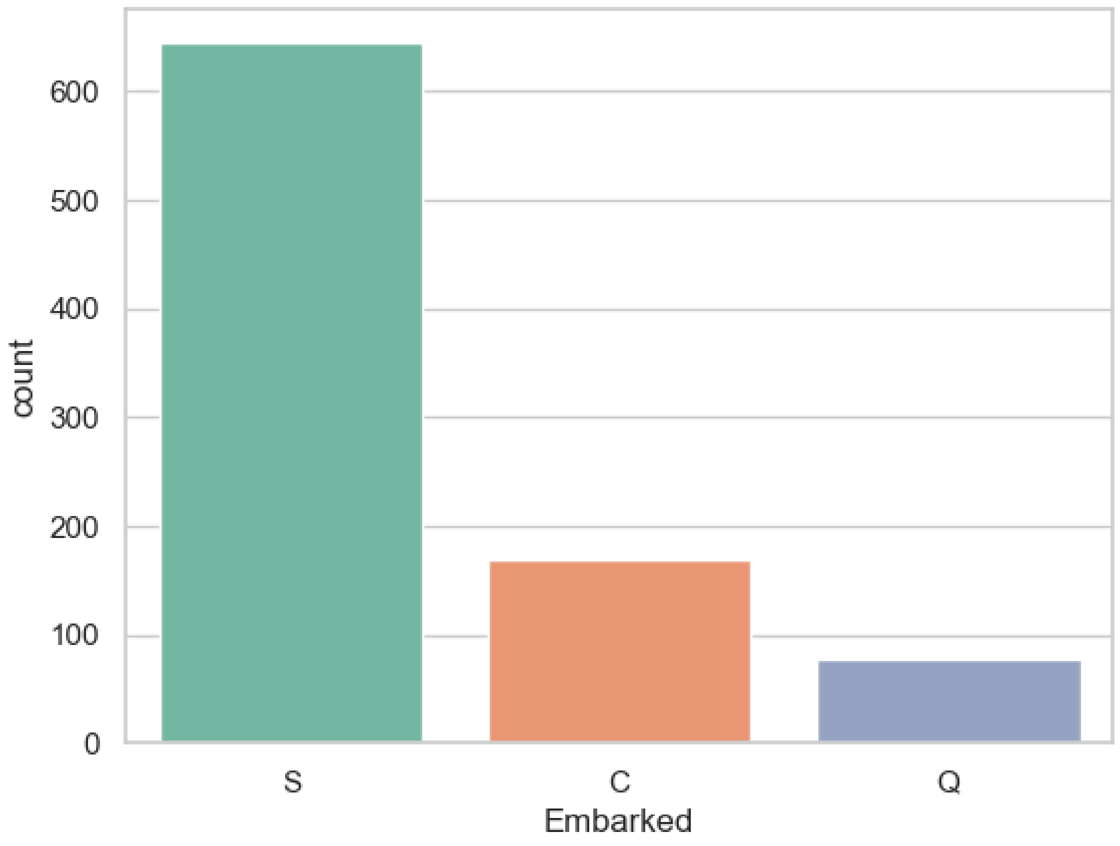
```
print((train_df['Embarked'].isnull().sum()/train_df.shape[0])*100)
```

```
0.22446689113355783
```

In [25]:

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

```
Boarded passengers grouped by port of embarkation (C = Cherbourg, Q = Quee
nstown,S =Southampton
S    644
C    168
Q     77
Name: Embarked, dtype: int64
```



In [26]:

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

```
S
```

In [28]:

```
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 [29]:

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

Out[29]:

```
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 [30]:

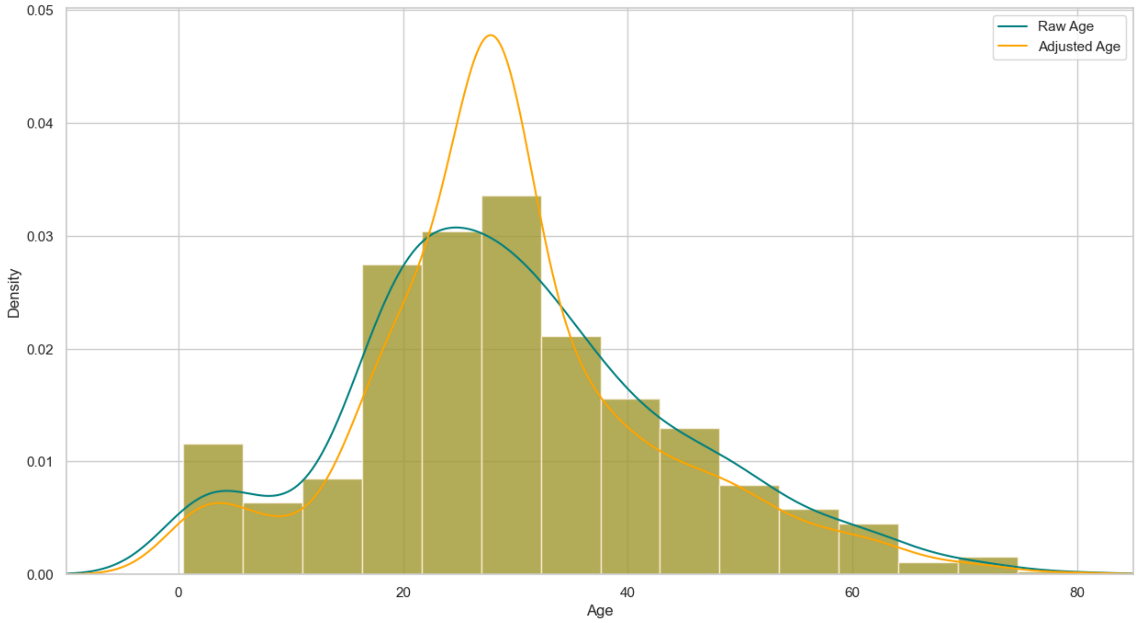
```
train_data.head()
```

Out[30]:

	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 [32]:

```
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_df["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 [33]:

```
##Create categorical variable and drop some variables
train_data['TravelAlone']=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 [34]:

```
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[34]:

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

In [35]:

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

Out[35]:

```
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 [36]:

```
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()
```

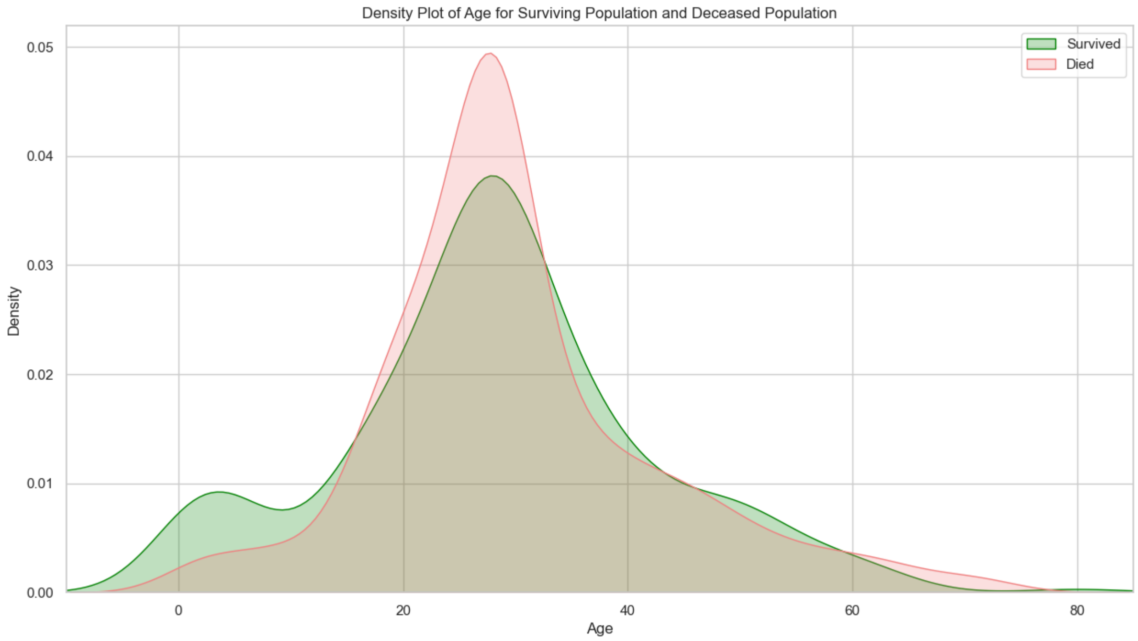
Out[36]:

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

EXPLORATORY DATA ANALYSIS

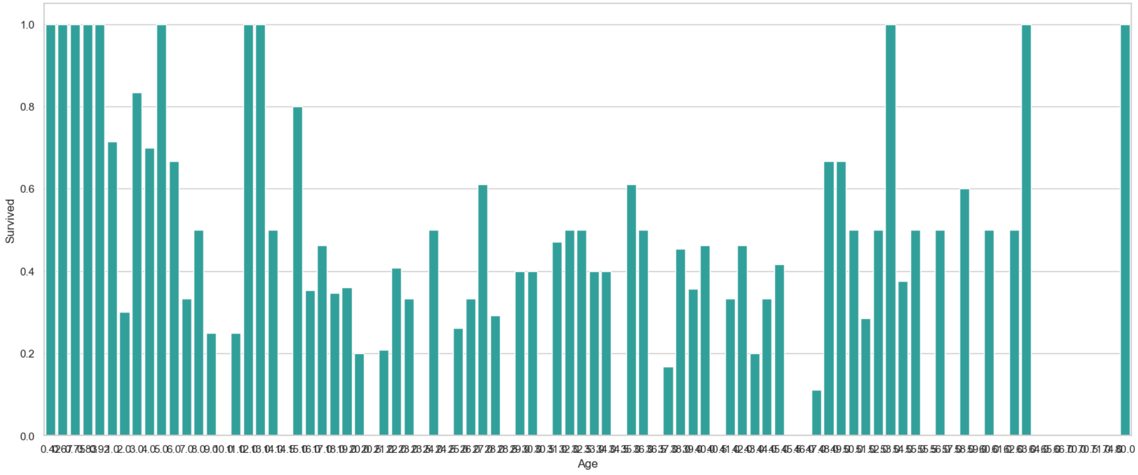
In [38]:

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



In [46]:

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



In [42]:

```
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
```

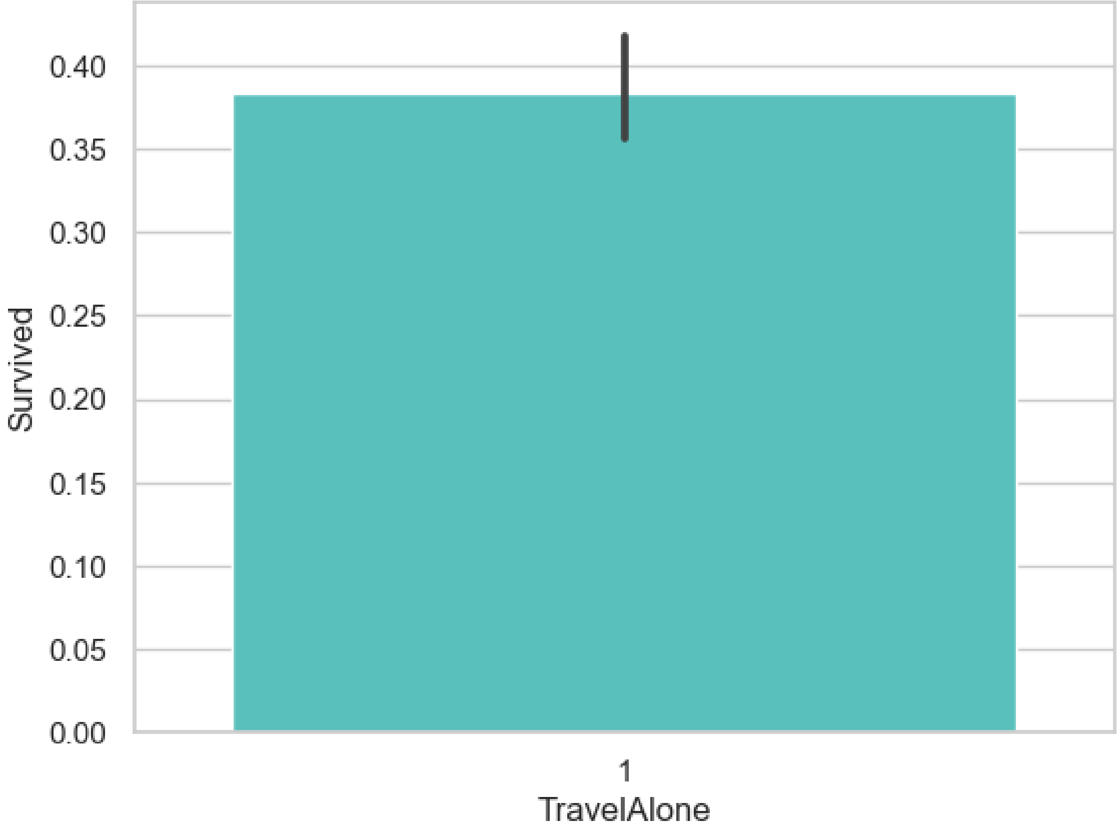
In [43]:

```
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
```

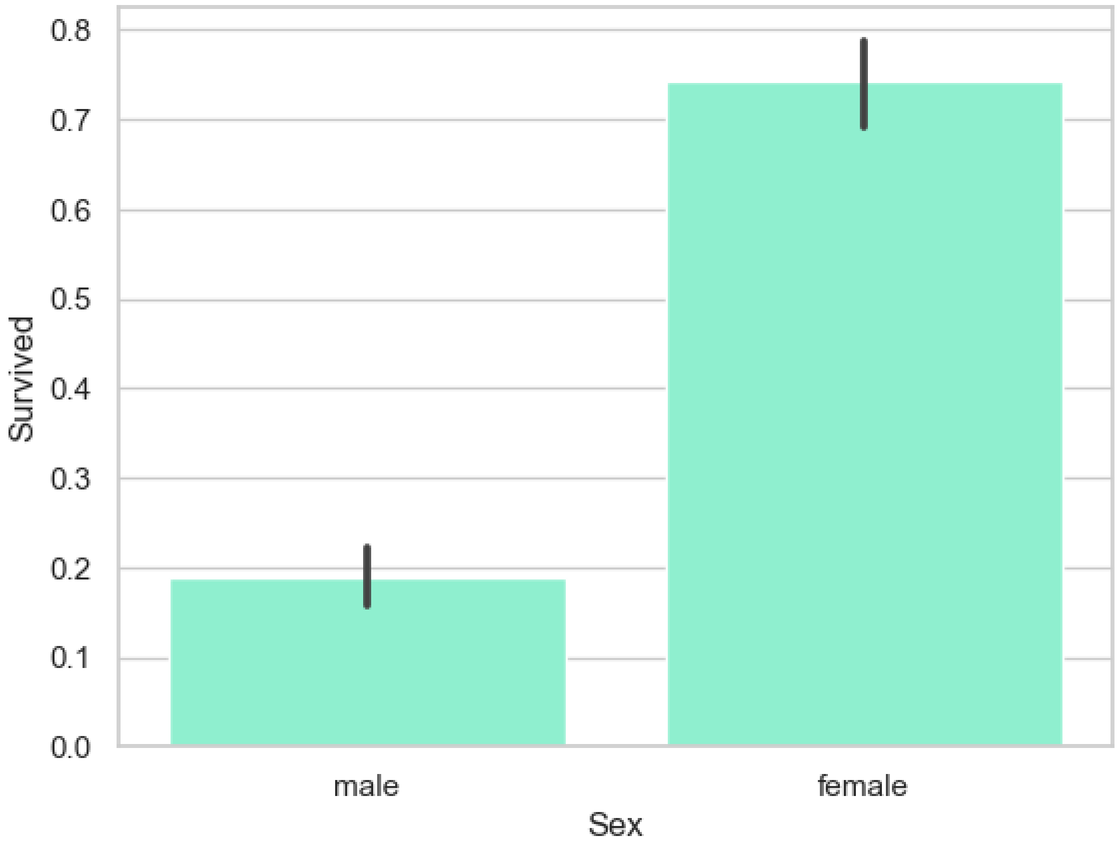
In [44]:

```
sns.barplot(x='TravelAlone', y='Survived', data=final_train, color="mediumturquoise")
plt.show()
```



In [45]:

```
import seaborn as sns
import matplotlib.pyplot as plt
# Assuming 'train_df' is your DataFrame containing the data
sns.barplot(x='Sex', y='Survived', data=train_df, color='aquamarine')
plt.show()
```



In [ ]:

```

```