In [1]:

```
import pandas as pd
import numpy as np
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\91955\Downloads\train.gender_submission.csv")
train_df
```

Out[2]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500	NaN
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2833	C85
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9250	NaN
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1000	C123
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	NaN
...	...	...	...	...	...	...	...	...	...	...	...
886	887	0	2	Montvila, Rev. Juozas	male	27.0	0	0	211536	13.0000	NaN
887	888	1	1	Graham, Miss. Margaret Edith	female	19.0	0	0	112053	30.0000	B42
888	889	0	3	Johnston, Miss. Catherine Helen "Carrie"	female	NaN	1	2	W./C. 6607	23.4500	NaN
889	890	1	1	Behr, Mr. Karl Howell	male	26.0	0	0	111369	30.0000	C148
890	891	0	3	Dooley, Mr. Patrick	male	32.0	0	0	370376	7.7500	NaN

891 rows × 12 columns

In [3]:

```
test_df=pd.read_csv(r"C:\Users\91955\Downloads\test.gender_submission.csv")
test_df
```

Out[3]:

	PassengerId	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Emba
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 [4]:

```
train_df.shape
```

Out[4]:

```
(891, 12)
```

In [5]:

```
1 train_df.head()
```

Out[5]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	I
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500	NaN	
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2833	C85	
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9250	NaN	
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1000	C123	
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	NaN	

In [6]:

```
1 train_df.info()
2
```

```
<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 [7]:

```
1 train_df.describe()
```

Out[7]:

	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 [8]:

```
1 test_df.shape
```

Out[8]:

```
(418, 11)
```

In [9]:

```
1 test_df.head()
```

Out[9]:

	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 [10]:

```
1 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
```

In [11]:

```
1 test_df.describe()
```

Out[11]:

	PassengerId	Pclass	Age	SibSp	Parch	Fare
count	418.000000	418.000000	332.000000	418.000000	418.000000	417.000000
mean	1100.500000	2.265550	30.272590	0.447368	0.392344	35.627188
std	120.810458	0.841838	14.181209	0.896760	0.981429	55.907576
min	892.000000	1.000000	0.170000	0.000000	0.000000	0.000000
25%	996.250000	1.000000	21.000000	0.000000	0.000000	7.895800
50%	1100.500000	3.000000	27.000000	0.000000	0.000000	14.454200
75%	1204.750000	3.000000	39.000000	1.000000	0.000000	31.500000
max	1309.000000	3.000000	76.000000	8.000000	9.000000	512.329200

In [12]:

```
1 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]:

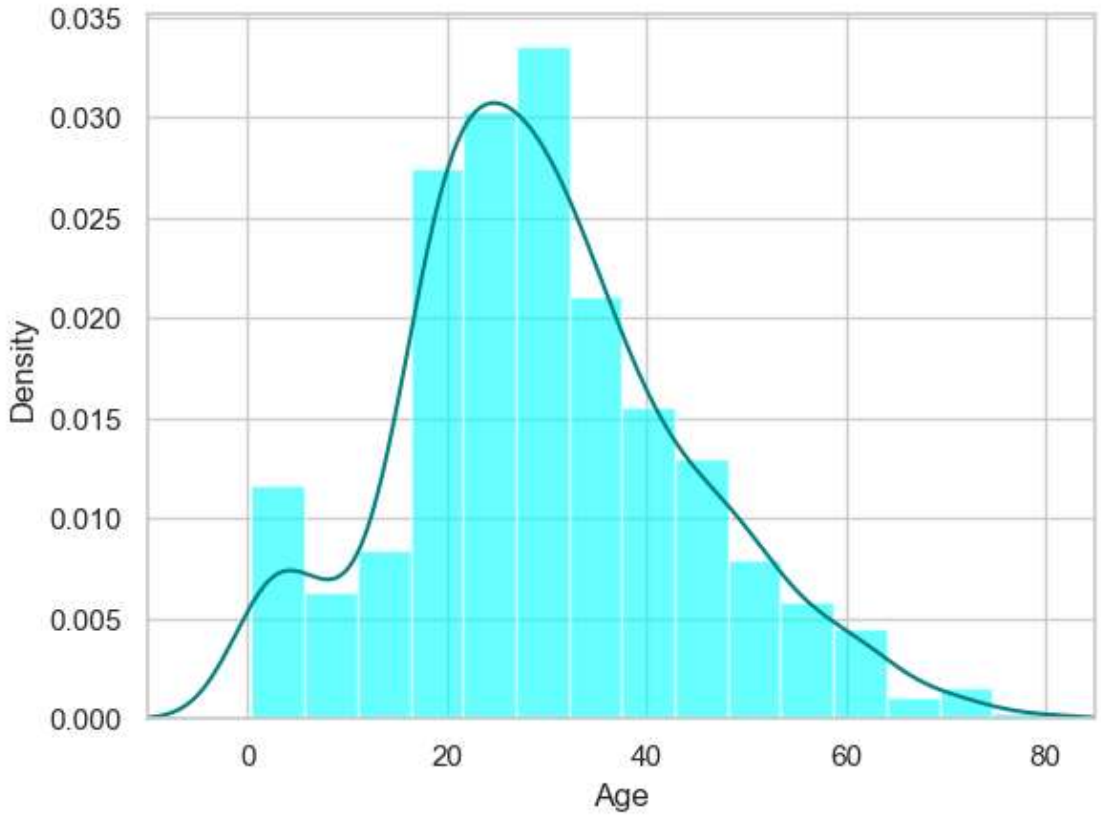
```
test_df.isnull().sum()
```

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')
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]:

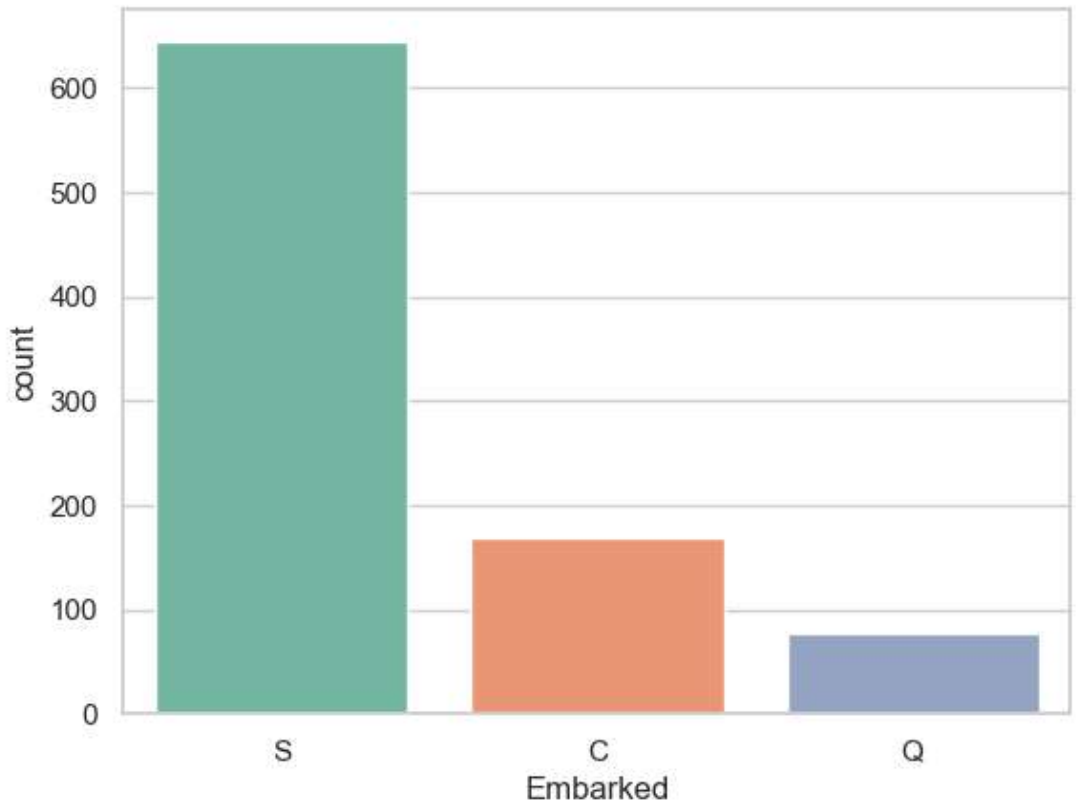
```
print((train_df['Embarked'].isnull().sum()/train_df.shape[0])*100)
```

```
0.22446689113355783
```

In [18]:

```
print('Boarded passengers grouped by port of embarkation (C=Cherbourg,Q=Queentown,S=Southamp
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=Queentown,S=Sout
hampton):
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(),inplace=True)
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]:

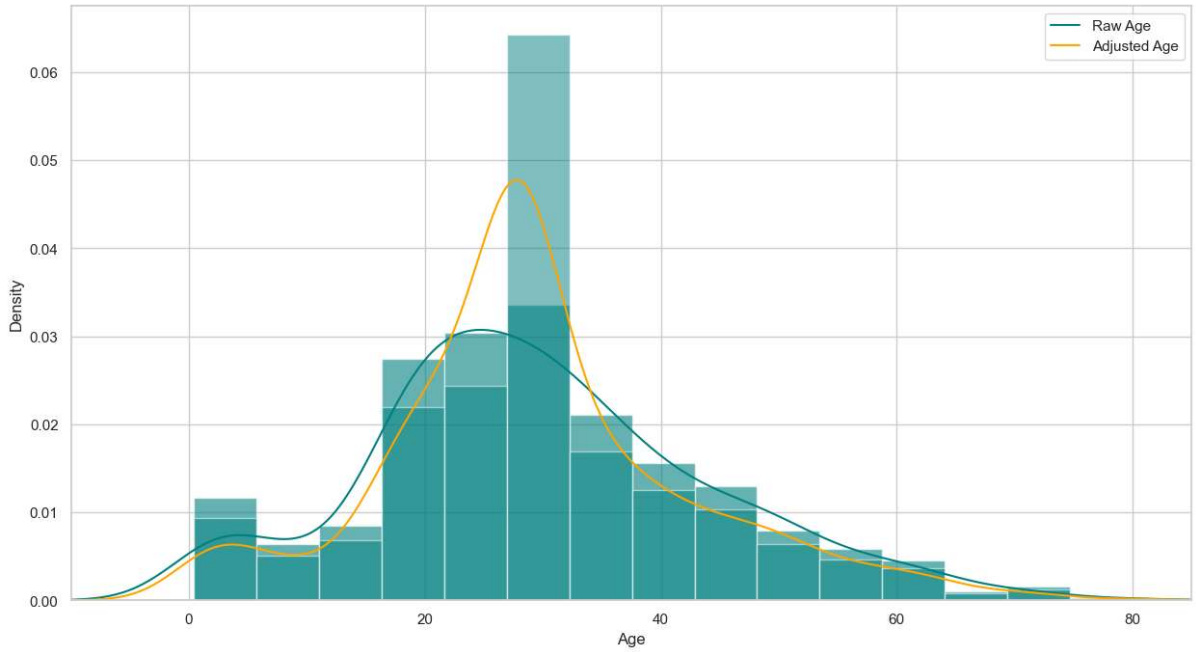
```
train_data.head()
```

Out[22]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Embarke
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=0.6)
train_df["Age"].plot(kind='density',color='teal')
ax=train_data["Age"].hist(bins=15,density=True,stacked=True,color='teal',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 [24]:

```
#categorical variable for traveling alone
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 [25]:

```
#create categorical variables and drop some variables
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_Q	Em
0	0	22.0	7.2500	0	False	False	True	False	False	
1	1	38.0	71.2833	0	True	False	False	True	False	
2	1	26.0	7.9250	1	False	False	True	False	False	
3	1	35.0	53.1000	0	True	False	False	False	False	
4	0	35.0	8.0500	1	False	False	True	False	False	

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]:

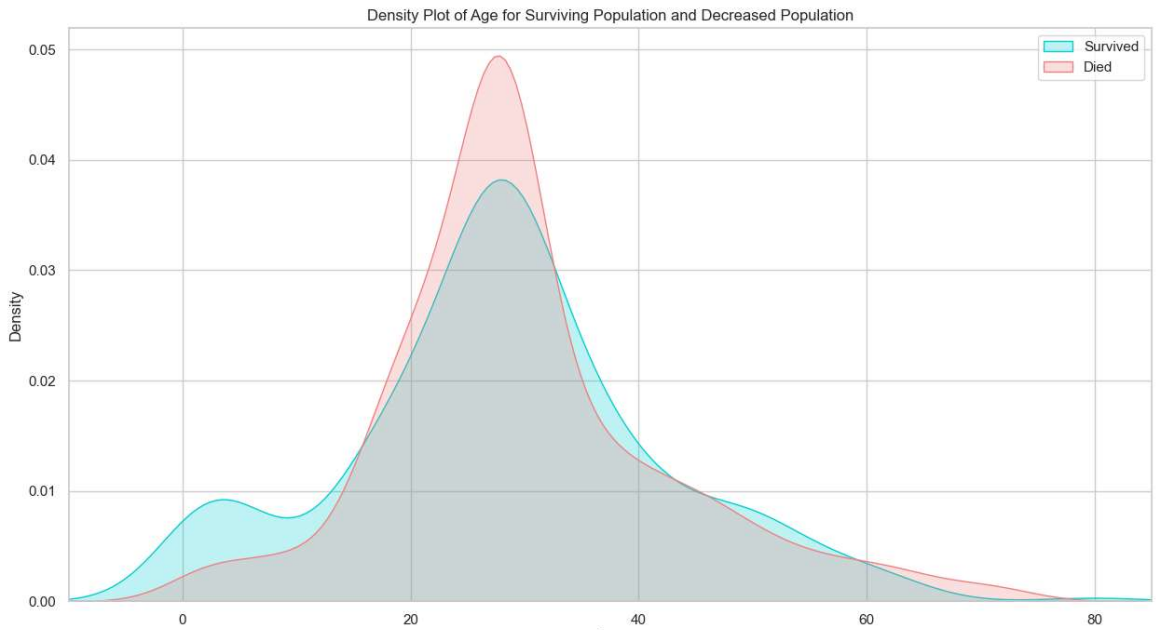
```
test_data=test_df.copy()
test_data["Age"].fillna(train_df["Age"].median(skipna=True),inplace=True)
test_data["Fare"].fillna(train_df["Fare"].median(skipna=True),inplace=True)
test_data.drop('Cabin',axis=1,inplace=True)

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[27]:

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

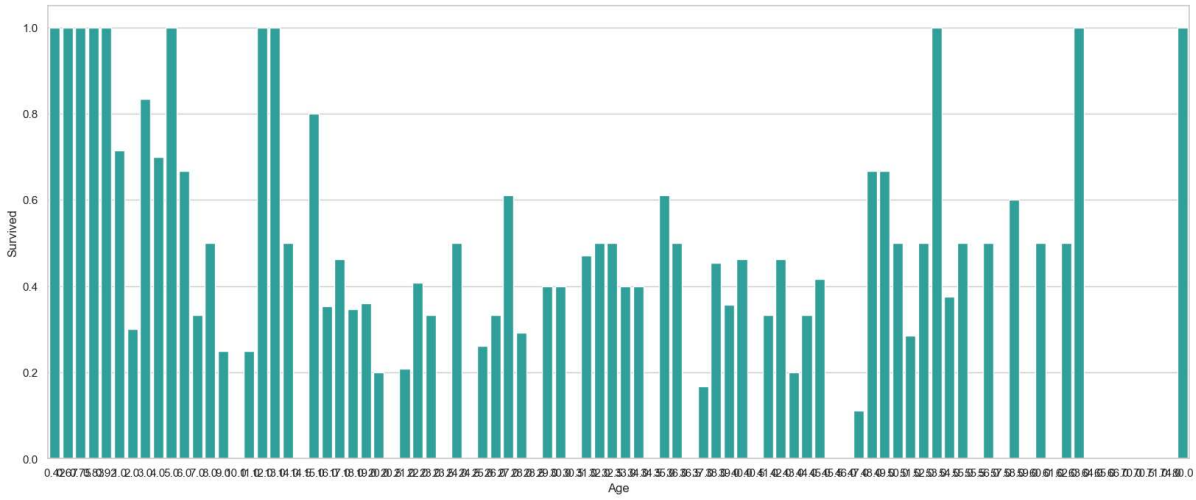
In [39]:

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



In [37]:

```
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
```

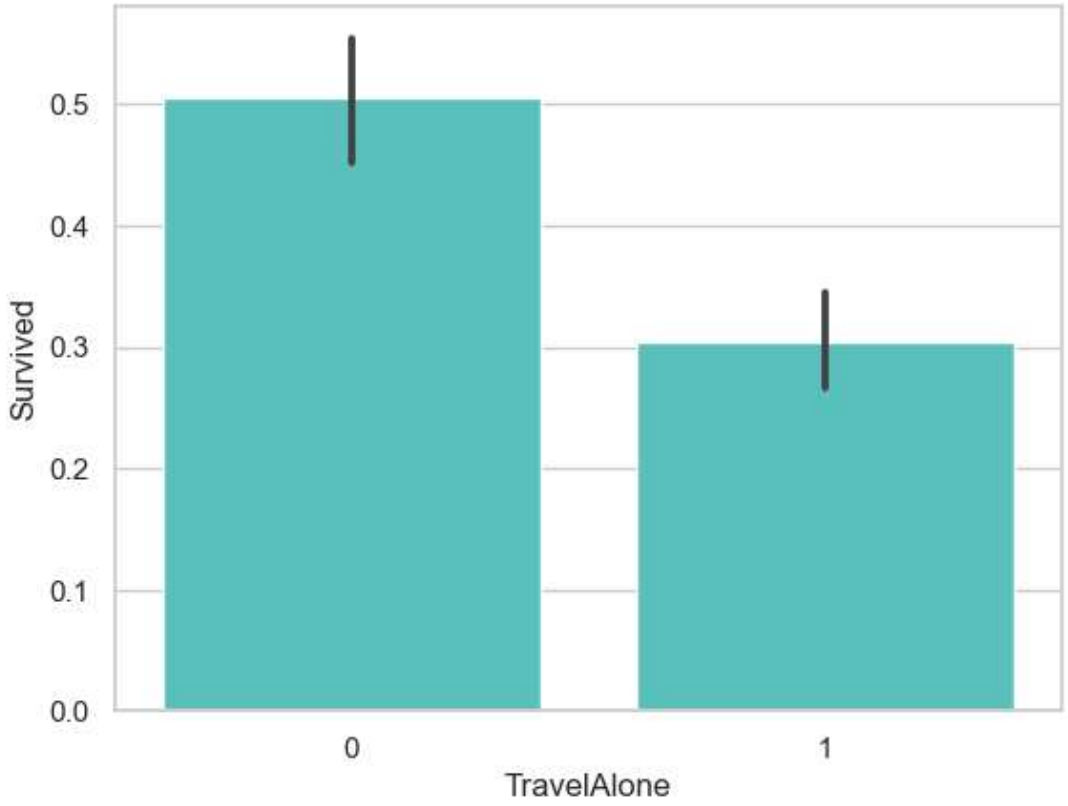
In [32]:

```
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
```

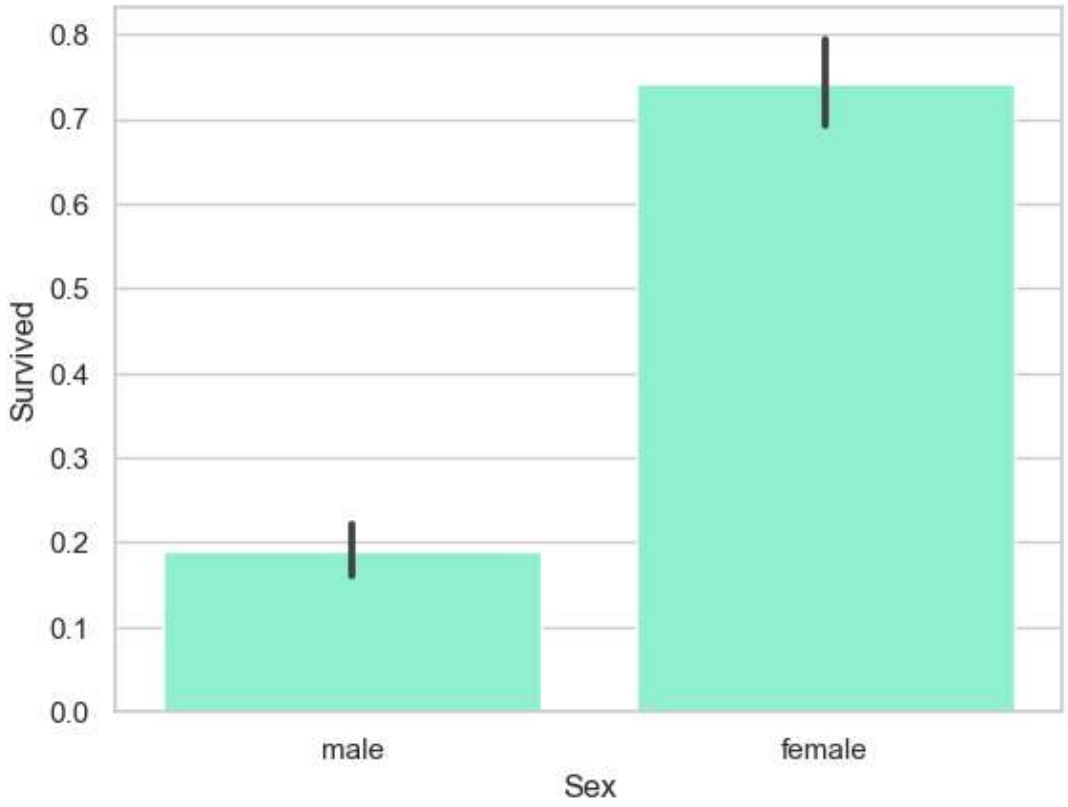
In [34]:

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



In [35]:

```
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 [ ]:

```
```