Description:

The sinking of the Titanic is one of the most infamous shipwrecks in history.

On April 15, 1912, during her maiden voyage, the widely considered “unsinkable” RMS Titanic sank after colliding with an iceberg. Unfortunately, there weren’t enough lifeboats for everyone on board, resulting in the death of 1502 out of 2224 passengers and crew.

While there was some element of luck involved in surviving, it seems some groups of people were more likely to survive than others.

Column Description

- survival- Survival 0 = No, 1 = Yes
- pclass- Ticket class 1 = 1st, 2 = 2nd, 3 = 3rd
- sex- Sex
- Age- Age in years
- sibsp# No of siblings/spouses aboard the Titanic
- parch# No of parents / children aboard the Titanic
- ticket- Ticket number
- fare- Passenger fare
- cabin- Cabin number
- embarked- Port of Embarkation C = Cherbourg, Q = Queenstown, S = Southampton

Acknowledgements:

This dataset has been referred from Kaggle: https://www.kaggle.com/c/titanic/data.

In [69]:
```
# Import the Dataset
# Import all the required libraries

import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns

import warnings
warnings.filterwarnings('ignore')
%matplotlib inline
```

In [70]:
```
df = pd.read_csv("/content/sample_data/titanic_train.csv")
df.head()
```

Out[70]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0

In [71]:
```
df.shape
```

Out[71]:
```
(891, 12)
```

In [72]:
```
df.size
```

Out[72]:
```
10692
```

In [73]:
```
df.ndim
```

Out[73]:
```
2
```

In [74]:
```
df.dtypes
```

Out[74]:

	0
PassengerId	int64
Survived	int64
Pclass	int64
Name	object
Sex	object
Age	float64
SibSp	int64
Parch	int64
Ticket	object
Fare	float64
Cabin	object
Embarked	object

dtype: object

In [75]:
```
df.describe()
```

Out[75]:

	PassengerId	Survived	Pclass	Age	SibSp	Parch	
count	891.000000	891.000000	891.000000	714.000000	891.000000	891.000000	891.000
mean	446.000000	0.383838	2.308642	29.699118	0.523008	0.381594	32.204
std	257.353842	0.486592	0.836071	14.526497	1.102743	0.806057	49.693
min	1.000000	0.000000	1.000000	0.420000	0.000000	0.000000	0.000
25%	223.500000	0.000000	2.000000	20.125000	0.000000	0.000000	7.910
50%	446.000000	0.000000	3.000000	28.000000	0.000000	0.000000	14.454
75%	668.500000	1.000000	3.000000	38.000000	1.000000	0.000000	31.000
max	891.000000	1.000000	3.000000	80.000000	8.000000	6.000000	512.329

In [76]:
```
df.describe(include ='all')
```

Out[76]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	
count	891.000000	891.000000	891.000000	891	891	714.000000	891.000000	89
unique	NaN	NaN	NaN	891	2	NaN	NaN	
top	NaN	NaN	NaN	Dooley, Mr. Patrick	male	NaN	NaN	
freq	NaN	NaN	NaN	1	577	NaN	NaN	
mean	446.000000	0.383838	2.308642	NaN	NaN	29.699118	0.523008	
std	257.353842	0.486592	0.836071	NaN	NaN	14.526497	1.102743	
min	1.000000	0.000000	1.000000	NaN	NaN	0.420000	0.000000	
25%	223.500000	0.000000	2.000000	NaN	NaN	20.125000	0.000000	
50%	446.000000	0.000000	3.000000	NaN	NaN	28.000000	0.000000	
75%	668.500000	1.000000	3.000000	NaN	NaN	38.000000	1.000000	
max	891.000000	1.000000	3.000000	NaN	NaN	80.000000	8.000000	

In [77]:
```
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 [78]:
```
df.nunique()
```

Out[78]:

	0
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

Pull all the unique values within all columns

In [79]:
```
df['Pclass'].unique()
```

Out[79]:
```
array([3, 1, 2])
```

In [80]:
```
df['Embarked'].unique()
```

Out[80]:
```
array(['S', 'C', 'Q', nan], dtype=object)
```

In [81]:
```
df['SibSp'].unique()
```

Out[81]:
```
array([1, 0, 3, 4, 2, 5, 8])
```

In [82]:
```
df["Survived"].unique()
```

Out[82]:
```
array([0, 1])
```

In [83]:
```
df["Sex"].unique()
```

Out[83]:
```
array(['male', 'female'], dtype=object)
```

Check Duplicates within the dataset

In [84]:
```
df.duplicated()
```

Out[84]:

	0
0	False
1	False
2	False
3	False
4	False
...	...
886	False
887	False
888	False
889	False
890	False

891 rows × 1 columns

dtype: bool

In [85]:
```
df.duplicated().sum()
```

Out[85]:
```
np.int64(0)
```

Check for Missing, Null values

In [86]:
```
df.isnull()
```

Out[86]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Ca
0	False	False	False	False	False	False	False	False	False	False	T
1	False	False	False	False	False	False	False	False	False	False	Fa
2	False	False	False	False	False	False	False	False	False	False	T
3	False	False	False	False	False	False	False	False	False	False	Fa
4	False	False	False	False	False	False	False	False	False	False	T
...	...	...	...	...	...	...	...	...	...	...	
886	False	False	False	False	False	False	False	False	False	False	T
887	False	False	False	False	False	False	False	False	False	False	Fa
888	False	False	False	False	False	True	False	False	False	False	T
889	False	False	False	False	False	False	False	False	False	False	Fa
890	False	False	False	False	False	False	False	False	False	False	T

891 rows × 12 columns

In [87]:
```
df.isnull().sum()
```

Out[87]:

	0
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 [88]:
```
## "Remove the 'cabin' column since it contains the highest number of missing va

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

In [89]:
```
df.head()
```

Out[89]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0

In [90]:
```
# "Proceed to handle the Age column, as there are 177 missing values present"

age_avg= df.Age.mean()  # finding the mean of age column
print(age_avg)
```

```
29.69911764705882
```

In [91]:
```
# Replace the missing values with the mean value of the column.

df["Age"].replace(np.nan,age_avg,inplace=True)
```

In [92]:
```
df.isnull().sum()
```

Out[92]:

	0
PassengerId	0
Survived	0
Pclass	0
Name	0
Sex	0
Age	0
SibSp	0
Parch	0
Ticket	0
Fare	0
Embarked	2

dtype: int64

In [93]:
```
# for categorical Column(String Data)-> mode/frequency

fiq = df.Embarked.dropna().mode()[0]
```

In [94]:
```
print(fiq)
```

```
S
```

In [95]:
```
df.Embarked.replace(np.nan, fiq, inplace = True)
```

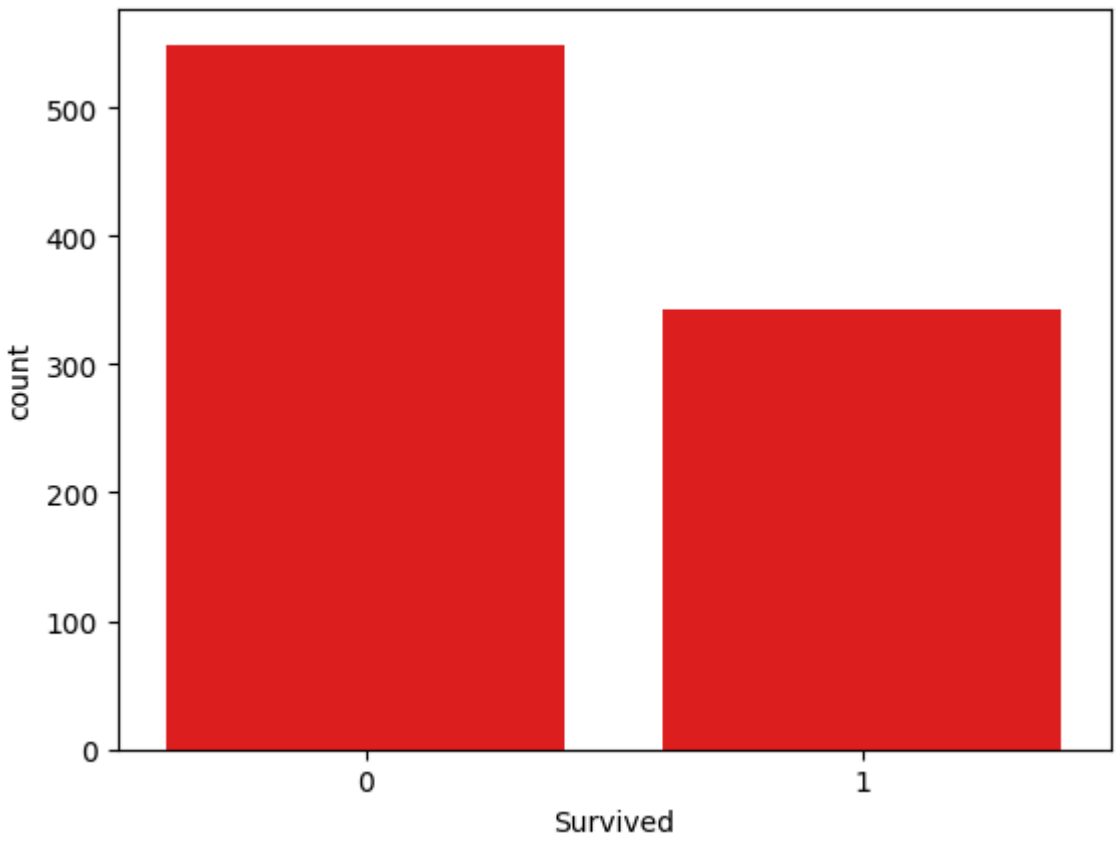
In [96]:
```
df.isnull().sum()
```

Out[96]:

	0
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 [97]:
```
# Plot the Survived and Dead

plt.figure(dpi = 100)
sns.countplot(x='Survived', data = df, color = 'red')
plt.show()
```



In [98]:
```
# Get the total counts of Survivors and Dead
```

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

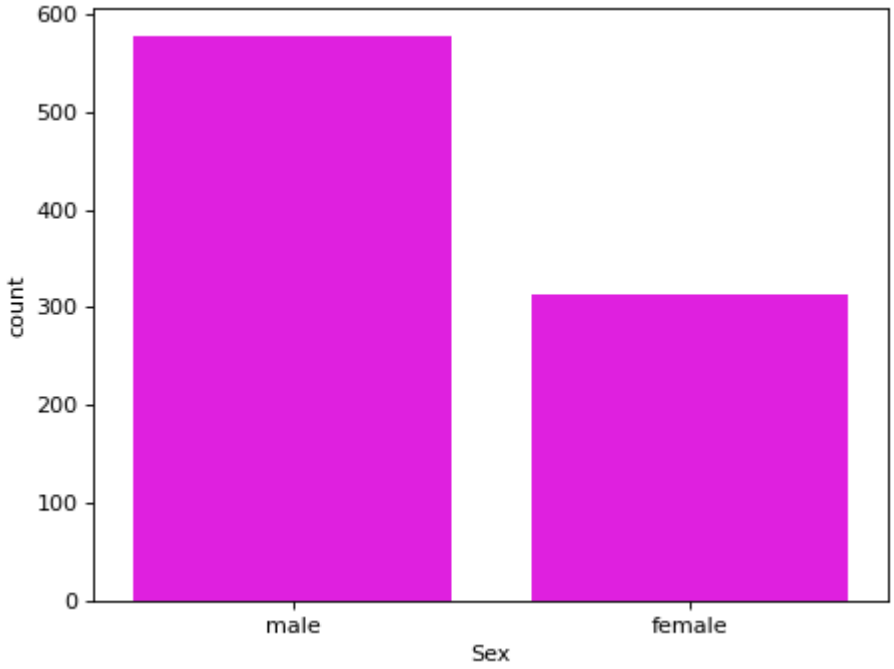
Out[98]:

Survived	count
0	549
1	342

dtype: int64

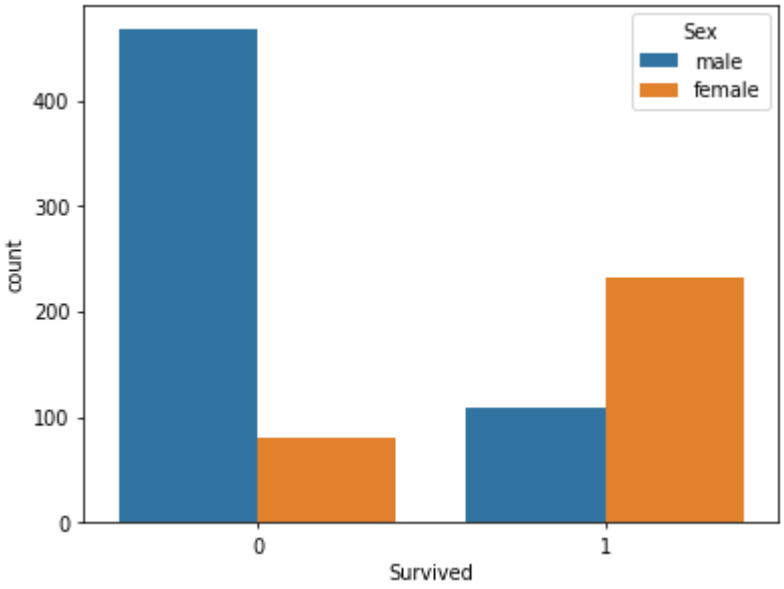
In [99]:
```
#  Get the male female survivors counts

plt.figure(dpi =80)
sns.countplot(x='Sex', data = df, color = "magenta")
```

Out[99]: <Axes: xlabel='Sex', ylabel='count'>



In [100…
```
# Get the male females survivors ratio

plt.figure(dpi = 70)
sns.countplot(x='Survived', hue = 'Sex', data = df)
```

Out[100… <Axes: xlabel='Survived', ylabel='count'>



In [101…
```
# Get the total count of survived male.

men_survival = df[df.Sex == 'male']['Survived'].count()
print(men_survival)
```

```
577
```

In [102…
```
# Get the survival rate for male

men_survival = df [ df.Sex == 'male']['Survived']

men_survival_rate = sum(men_survival) / len (men_survival)*100
```

In [103…
```
print(sum(men_survival))
```

```
109
```

In [104…
```
print(men_survival)
```

```
0      0
4      0
5      0
6      0
7      0
      ..
883    0
884    0
886    0
889    1
890    0
Name: Survived, Length: 577, dtype: int64
```

In [105…
```
print(men_survival_rate)
```

```
18.890814558058924
```

In [106…
```
# Total number of male survived using method 1

df[(df.Sex == 'male') & (df.Survived == 1)].count()
```

Out[106…

	0
PassengerId	109
Survived	109
Pclass	109
Name	109
Sex	109
Age	109
SibSp	109
Parch	109
Ticket	109
Fare	109
Embarked	109

dtype: int64

In [107…
```
# Method 2

len(df[(df.Sex == 'male') & (df.Survived == 1)])
```

Out[107… 109

In [108…
```
# Get the female survivor rate

female_survival= df [df.Sex=="female"]["Survived"] #males are excluded
female_survival_rate=sum(female_survival)/len(female_survival)*100
```

In [109…
```
print(sum(female_survival))
```

```
233
```

In [110…
```
print(female_survival)
```

```
1      1
2      1
3      1
8      1
9      1
      ..
880    1
882    0
885    0
887    1
888    0
Name: Survived, Length: 314, dtype: int64
```

In [111…
```
print(female_survival_rate)
```

```
74.20382165605095
```

Female survivor's rate is greater then male.

In [112…
```
res= df.groupby("Sex")["Survived"].value_counts()
print(res)
```

```
Sex     Survived
female  1           233
        0            81
male    0           468
        1           109
Name: count, dtype: int64
```

In [113…
```
# give the percentage of survival

res= df .groupby("Sex")["Survived"].value_counts(normalize=True)
print(res)
```

```
Sex     Survived
female  1           0.742038
        0           0.257962
male    0           0.811092
        1           0.188908
Name: proportion, dtype: float64
```

In [114…
```
#female survived
print("percentage of Women survived",res[0]*100)
```

```
percentage of Women survived 74.20382165605095
```

In [115…
```
# female Not Survived

print("percentage of Women not survived",res[1]*100)
```

```
percentage of Women not survived 25.796178343949045
```

In [116…
```
#Male Survived

print("percentage of Men survived",res[2]*100)
```

```
percentage of Men survived 81.10918544194108
```

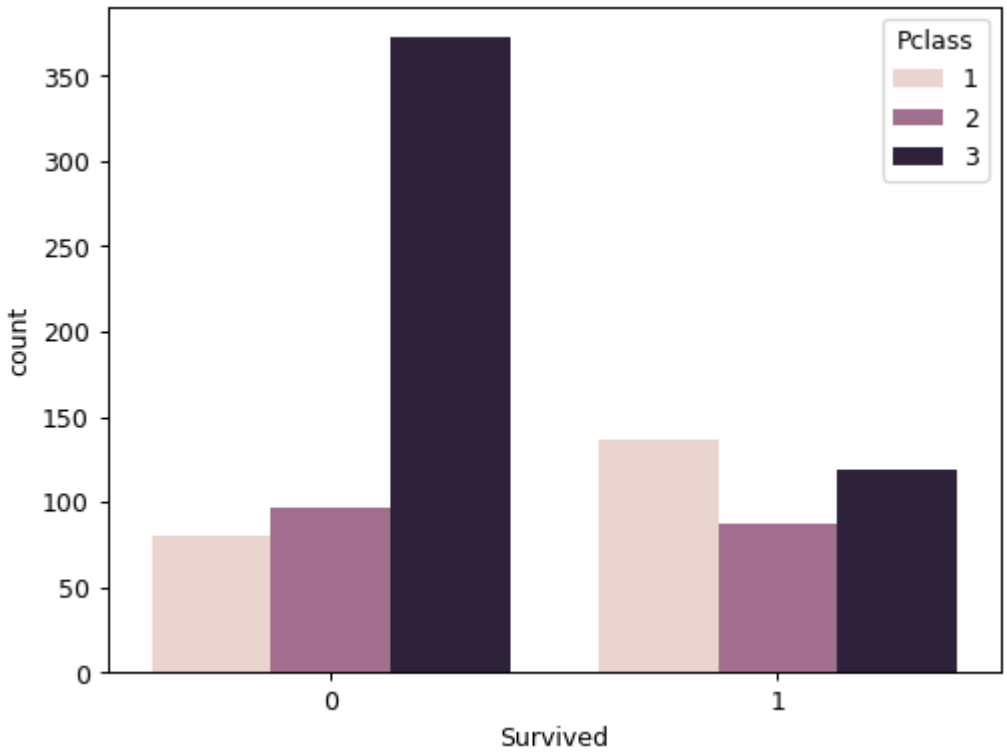
In [117…
```
#male not survived

print("percentage of Men not survived",res[3]*100)
```

```
percentage of Men not survived 18.890814558058924
```

Survival Rate Based on Passanger Class

In [118…
```
# Survived Vs Pclass

plt.figure(dpi = 90)
sns.countplot(x='Survived', hue = 'Pclass', data = df)
```

Out[118…
```
<Axes: xlabel='Survived', ylabel='count'>
```



In [119…
```
res1 = df.groupby('Pclass')['Survived'].value_counts(normalize = True)
print(res1)
```

```
Pclass  Survived
1       1           0.629630
        0           0.370370
2       0           0.527174
        1           0.472826
3       0           0.757637
        1           0.242363
Name: proportion, dtype: float64
```

In [120…
```
res1 = df.groupby('Pclass')['Survived'].value_counts()
```

In [121…
```
print(res1)
```

```
Pclass  Survived
1       1           136
        0            80
2       0            97
        1            87
3       0           372
        1           119
Name: count, dtype: int64
```

In [122…
```
print("percentage Not survival of class1",res1[1][0]*100)
```

```
percentage Not survival of class1 8000
```

In [123…
```
print("percentage survival of class1",res1[1][1]*100)
```

```
percentage survival of class1 13600
```

In [124…
```
print("percentage Not survival of class2",res1[2][0]*100)
print("percentage survival of class2",res1[2][1]*100)
```

```
percentage Not survival of class2 9700
percentage survival of class2 8700
```

In [125…
```
print("percentage Not survival of class3",res1[3][0]*100)
print("percentage survival of class3",res1[3][1]*100)
```

```
percentage Not survival of class3 37200
percentage survival of class3 11900
```

Survivor rate from Pclass == 1

In [126…
```
#total people with Pclass 1 that are in survived cloumn

total_survived=df[df.Pclass==1]["Survived"]
```

In [127…
```
#percentage of total survival rate, those who are survived from pclass 1

total_survival_rate=sum(total_survived)/len(total_survived)*100
```

In [128…
```
#len of Pclass 1
print(len(total_survived))
```

```
216
```

In [129…
```
#sum of total survival people
print(sum(total_survived))
```

```
136
```

In [130…
```
#percentage of all survived people from Pclass 1
print(total_survival_rate)
```

```
62.96296296296296
```

Survivor Rate from Pclass == 2

In [131…
```
total_survived = df[df.Pclass==2]["Survived"]

total_survival_rate = sum(total_survived)/len(total_survived)*100

print(len(total_survived))
print(sum(total_survived))
print(total_survival_rate)
```

```
184
87
47.28260869565217
```

Survivor Rate from Pclass == 3

In [132…
```
total_survived = df[df.Pclass==3]["Survived"]

total_survival_rate = sum(total_survived)/len(total_survived)*100

print(len(total_survived))
```

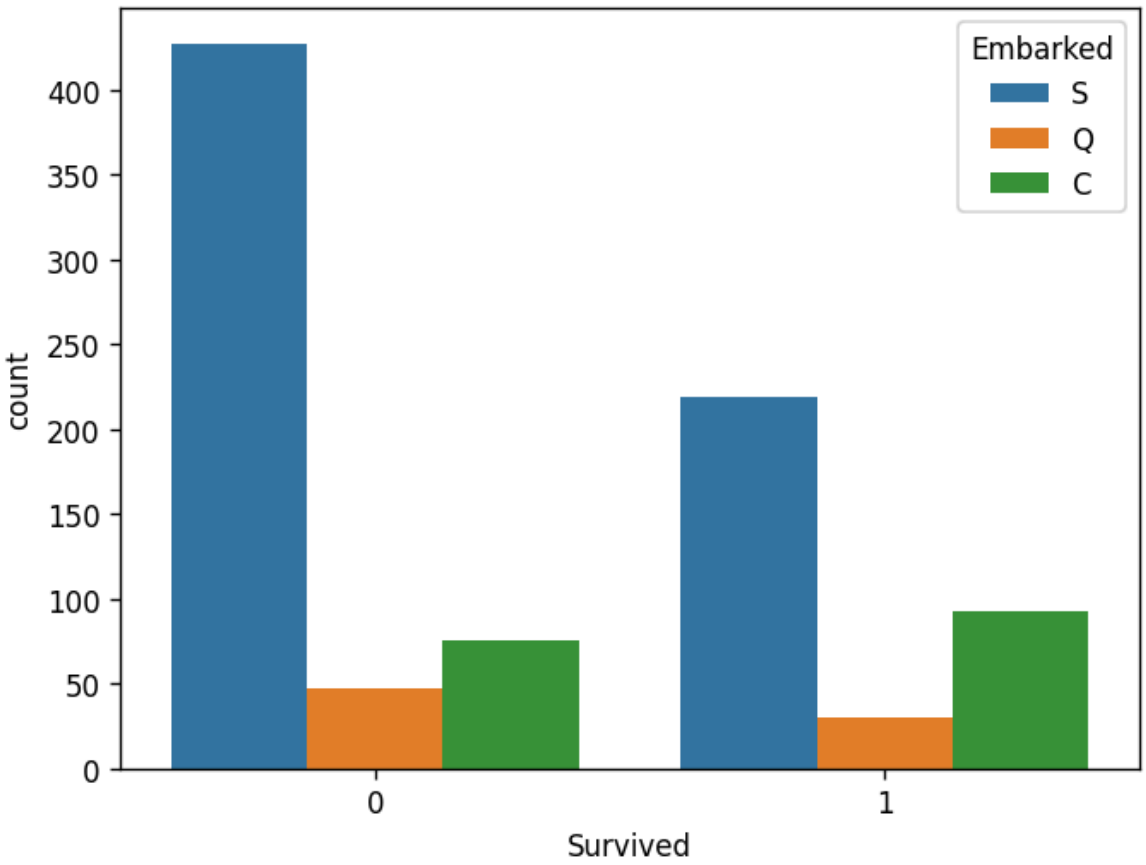
```
print(sum(total_survived))
print(total_survival_rate)
```

```
491
119
24.236252545824847
```

Survival Based on Embarked

In [133…
```
plt.figure(dpi=120)
sns.countplot(x="Survived", hue="Embarked", data = df)
```

Out[133…
```
<Axes: xlabel='Survived', ylabel='count'>
```



In [134…
```
df["Embarked"].value_counts()
```

Out[134…

Embarked	count
S	646
C	168
Q	77

dtype: int64

Embarked == "S"

In [136…
```
total_survived = df[df.Embarked=="S"]["Survived"]

total_survival_rate=sum(total_survived)/len(total_survived)*100

print(len(total_survived))
print(sum(total_survived))
print(total_survival_rate)
```

```
646
219
33.90092879256966
```

Embarked == "C"

In [137…
```
total_survived = df[df.Embarked=="C"]["Survived"]

total_survival_rate=sum(total_survived)/len(total_survived)*100


print(len(total_survived))
print(sum(total_survived))
print(total_survival_rate)
```

```
168
93
55.35714285714286
```

Embarked == "Q"

In [138…
```
total_survived = df[df.Embarked=="Q"]["Survived"]

total_survival_rate=sum(total_survived)/len(total_survived)*100


print(len(total_survived))
print(sum(total_survived))
print(total_survival_rate)
```

```
77
30
38.961038961038966
```

In [139…
```
res2 = df.groupby('Embarked')['Survived'].value_counts()
```

In [141…
```
(res2)
```

Out[141...

		count
Embarked	**Survived**	
C	**1**	93
	0	75
Q	**0**	47
	1	30
S	**0**	427
	1	219

dtype: int64

In [143...

```
res2 = df.groupby('Embarked')['Survived'].count()
res2
```

Out[143...

	Survived
Embarked	
C	168
Q	77
S	646

dtype: int64

In [144...

```
res2 = df.groupby('Embarked')['Survived'].value_counts(normalize = True)
print(res2)
```

```
Embarked  Survived
C         1           0.553571
          0           0.446429
Q         0           0.610390
          1           0.389610
S         0           0.660991
          1           0.339009
Name: proportion, dtype: float64
```

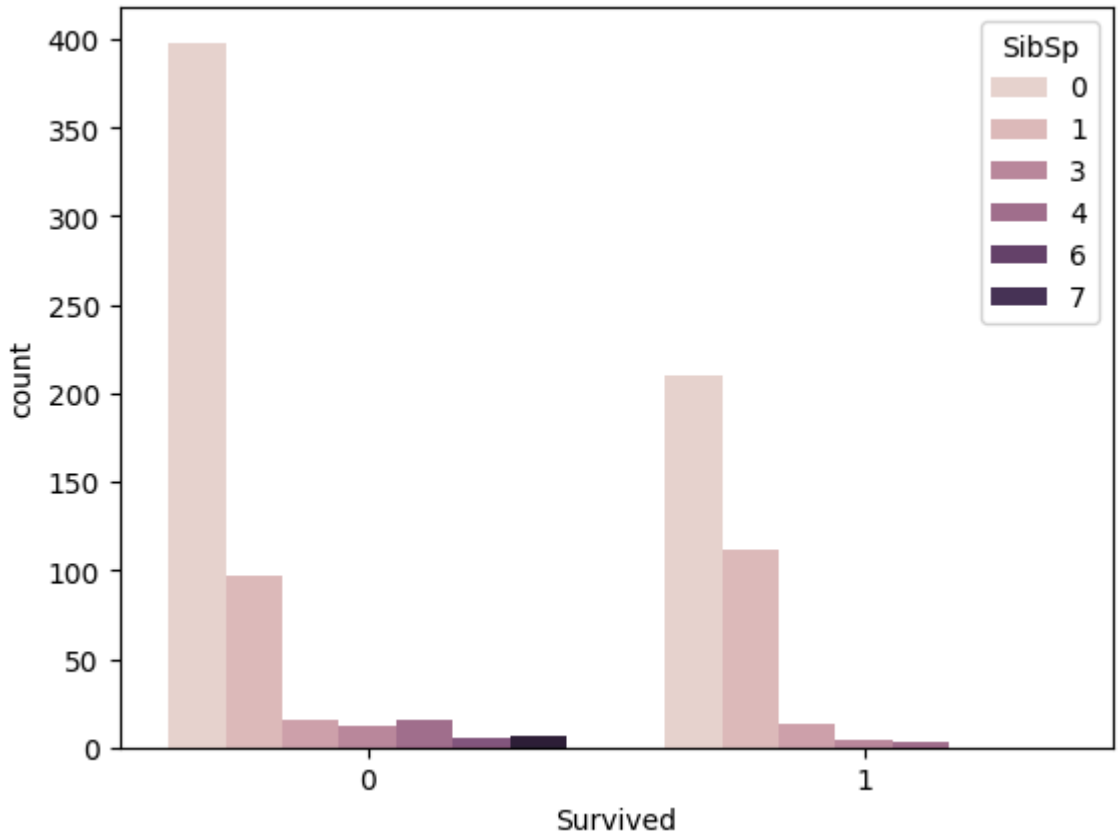
Survival Based on SibSp

In [145...

```
plt.figure(dpi=100)
sns.countplot(x="Survived",hue="SibSp",data = df)
```

Out[145...

```
<Axes: xlabel='Survived', ylabel='count'>
```



In [146…
```
res3 = df.groupby("SibSp")['Survived'].value_counts()
print(res3)
```

```
SibSp  Survived
0      0           398
       1           210
1      1           112
       0            97
2      0            15
       1            13
3      0            12
       1             4
4      0            15
       1             3
5      0             5
8      0             7
Name: count, dtype: int64
```

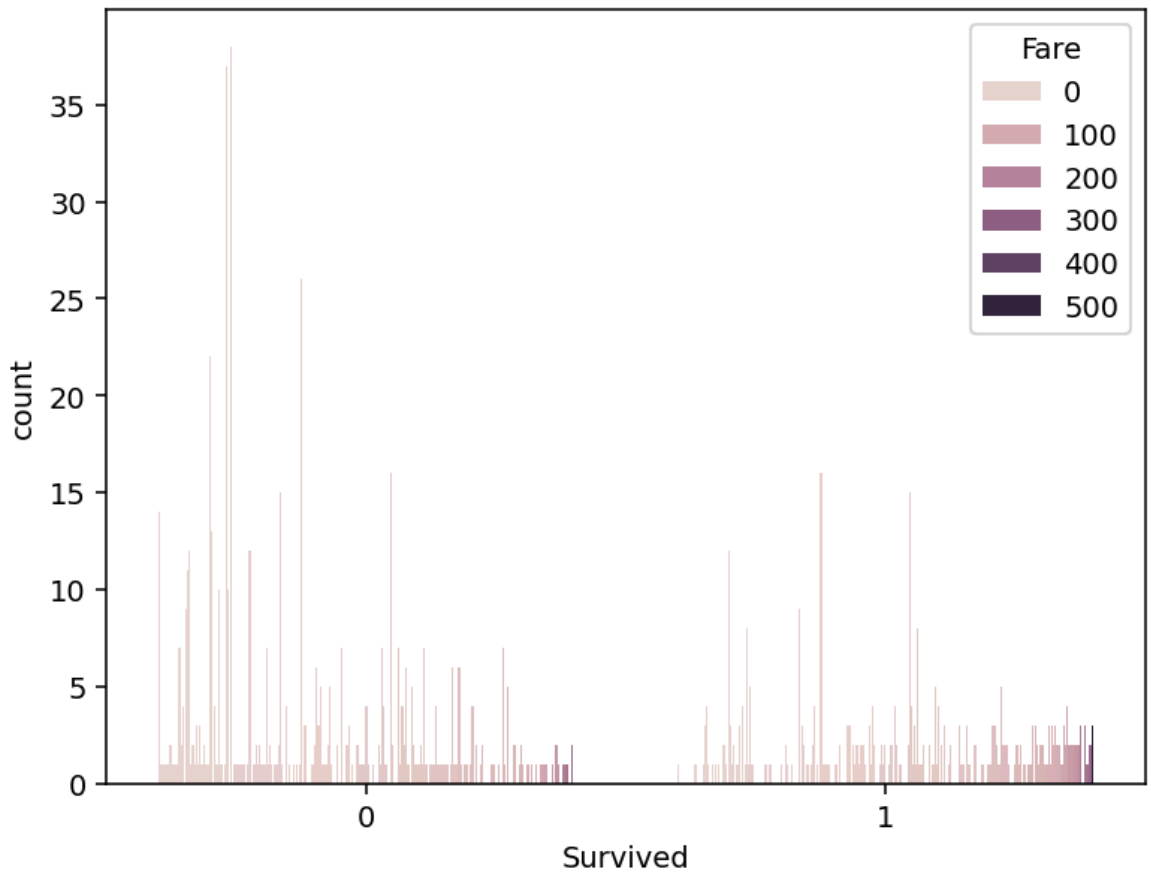
In [147…
```
res3 = df.groupby("SibSp")['Survived'].value_counts(normalize = True)

print(res3)
```

```
SibSp  Survived
0      0           0.654605
       1           0.345395
1      1           0.535885
       0           0.464115
2      0           0.535714
       1           0.464286
3      0           0.750000
       1           0.250000
4      0           0.833333
       1           0.166667
5      0           1.000000
8      0           1.000000
Name: proportion, dtype: float64
```

Survival Based on Fare

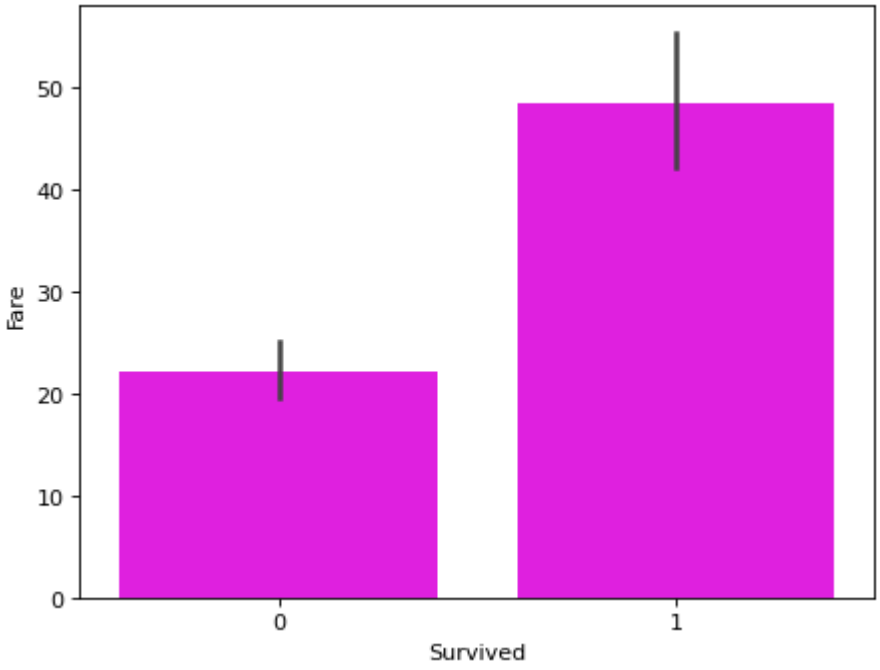
In [149…
```
plt.figure(dpi=140)
sns.countplot(x = "Survived",hue = "Fare",data = df)
```

Out[149…
```
<Axes: xlabel='Survived', ylabel='count'>
```



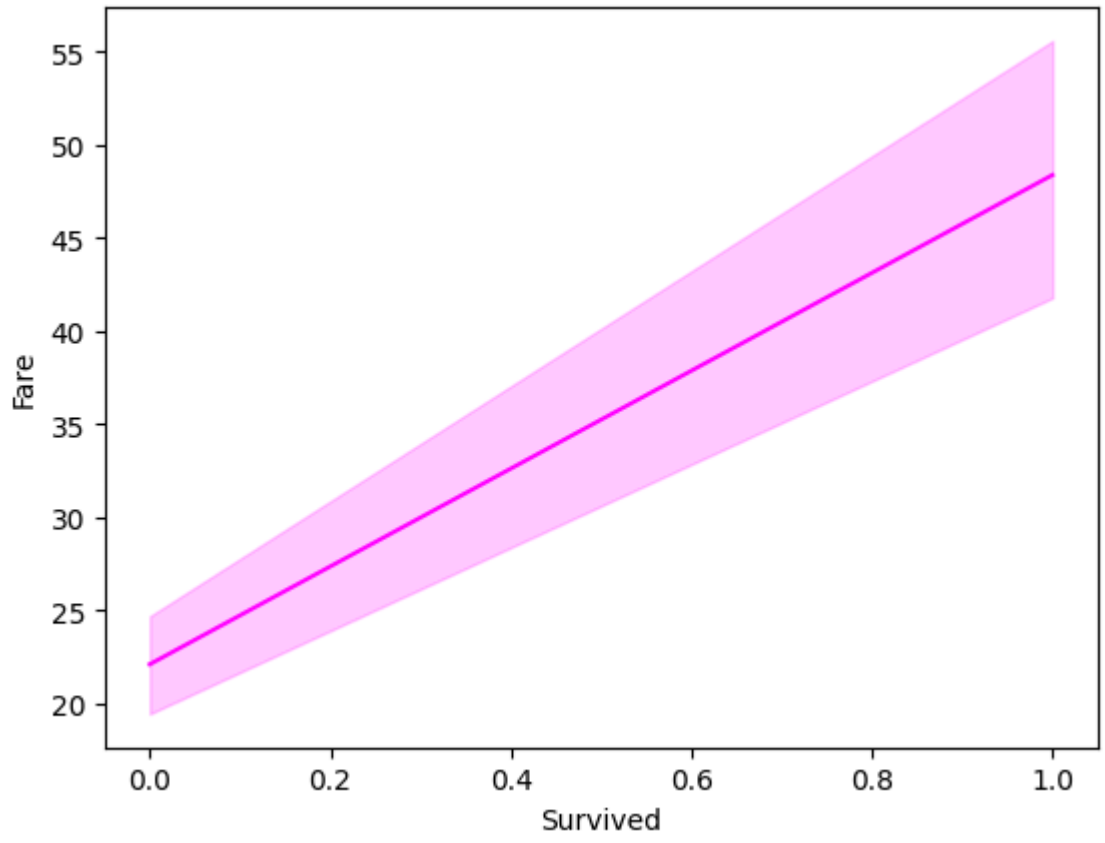
In [151…
```
plt.figure(dpi = 80)
sns.barplot(x = 'Survived', y = 'Fare', data = df, color = 'magenta')
```

Out[151…
```
<Axes: xlabel='Survived', ylabel='Fare'>
```



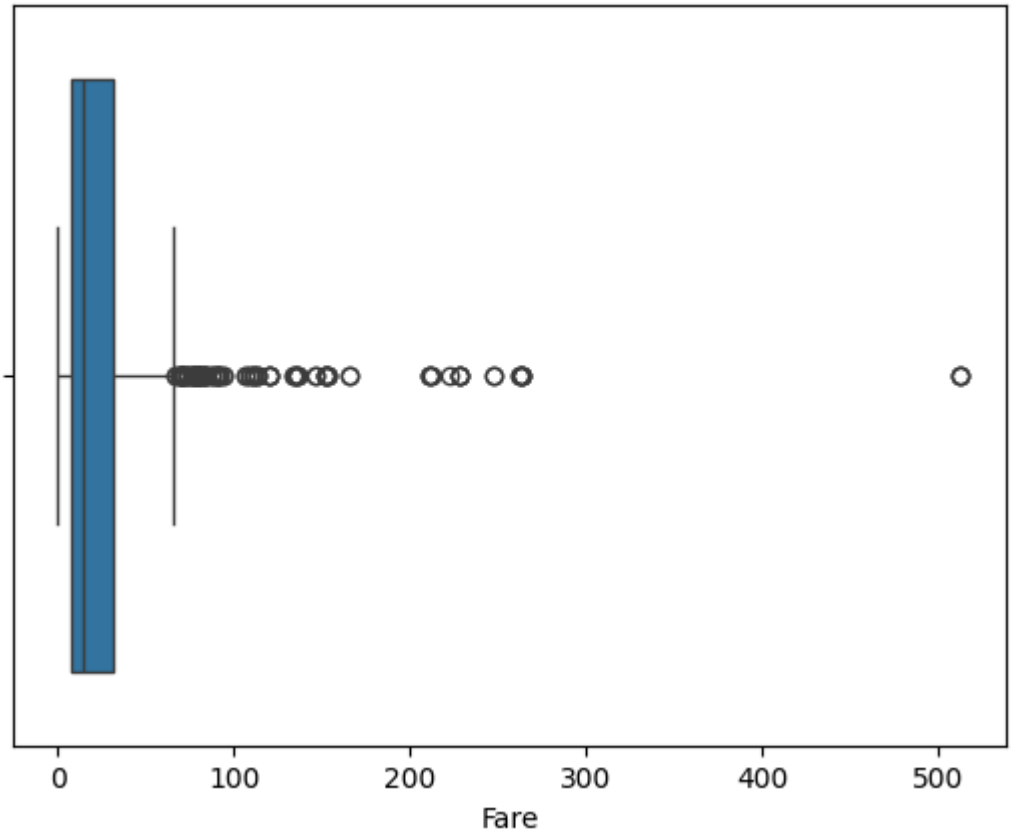
In [152…
```
plt.figure(dpi = 100)
sns.lineplot(x = 'Survived', y = 'Fare', data = df, color = 'magenta')
```

Out[152…
```
<Axes: xlabel='Survived', ylabel='Fare'>
```



In [154…
```
plt.figure(dpi=100)
sns.boxplot(x="Fare",data = df)
```

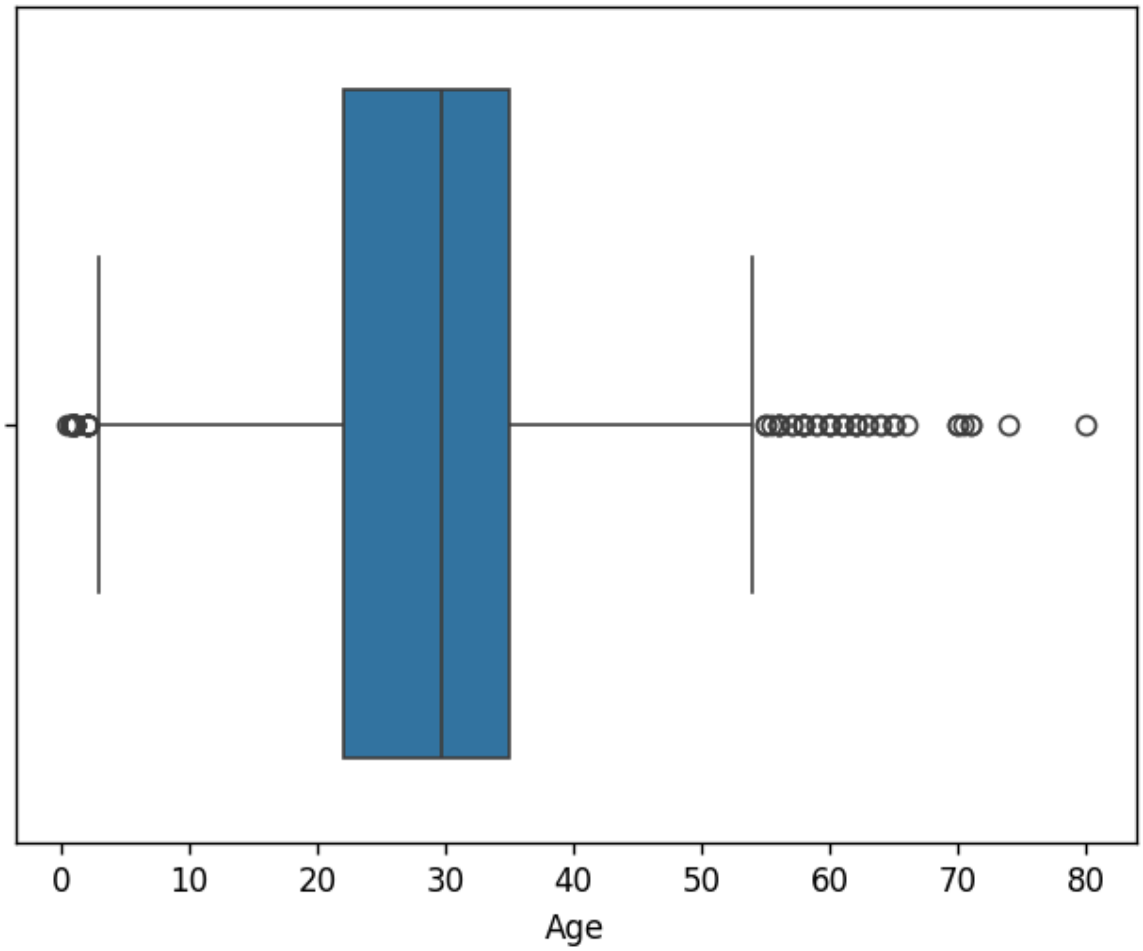
Out[154…
```
<Axes: xlabel='Fare'>
```



Survived vs Age

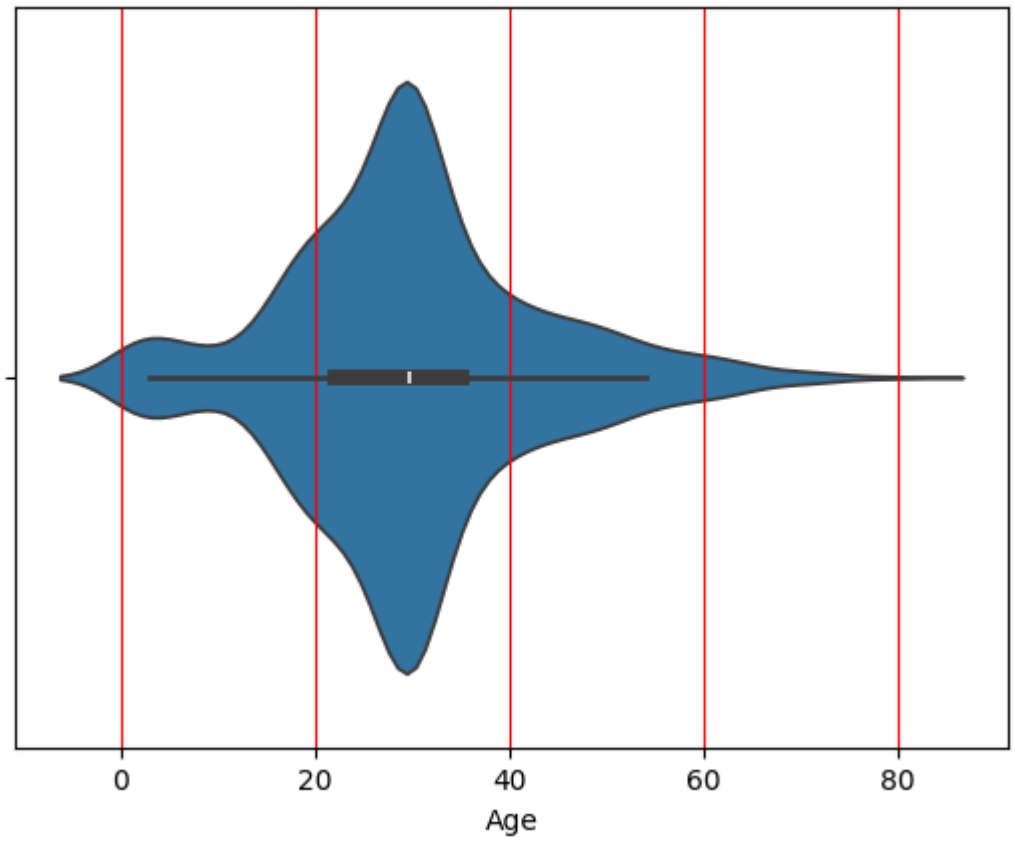
In [156…
```
plt.figure(dpi=120)
sns.boxplot(x="Age",data= df)
```

Out[156…
```
<Axes: xlabel='Age'>
```



In [157…
```
plt.figure(dpi=100)
plt.grid(color="red")
sns.violinplot(x="Age",data = df)
```

Out[157…
```
<Axes: xlabel='Age'>
```



In [159…
```
# Get the age Quantile (0.25, 0.50, 0.75)

df.Age.quantile(0.25)
```

Out[159…
```
np.float64(22.0)
```

In [160…
```
df.Age.quantile(0.50)
```

Out[160…
```
np.float64(29.69911764705882)
```

In [161…
```
df.Age.quantile(0.75)
```

Out[161…
```
np.float64(35.0)
```

In [162…
```
df.groupby(["Sex","Survived"])["Age"].mean()
```

Out[162…

		Age
Sex	**Survived**	
female	**0**	26.023272
	1	28.979263
male	**0**	31.175224
	1	27.631705

dtype: float64