Data Visualization II

- Use the inbuilt dataset 'titanic' as used in the above problem. Plot a box plot for distribution of age with respect to each gender along with the information about whether they survived or not. (Column names : 'sex' and 'age')
- Write observations on the inference from the above statistics.

In [18]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

In [19]:
```
train = pd.read_csv("Titanic.csv")
```

In [20]:
```
train.head(10)
```

Out [20]:

	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
5	6	0	3	Moran, Mr. James	male	NaN	0	0	330877	8.4583	NaN	Q
6	7	0	1	McCarthy, Mr. Timothy J	male	54.0	0	0	17463	51.8625	E46	S
7	8	0	3	Palsson, Master. Gosta Leonard	male	2.0	3	1	349909	21.0750	NaN	S
8	9	1	3	Johnson, Mrs. Oscar W (Elisabeth Vilhelmina Berg)	female	27.0	0	2	347742	11.1333	NaN	S
9	10	1	2	Nasser, Mrs. Nicholas (Adele Achem)	female	14.0	1	0	237736	30.0708	NaN	C

In [21]:
```
train.drop(["PassengerId",'Ticket'],axis = 1,inplace = True)
```

In [22]:
```
train.info()
```

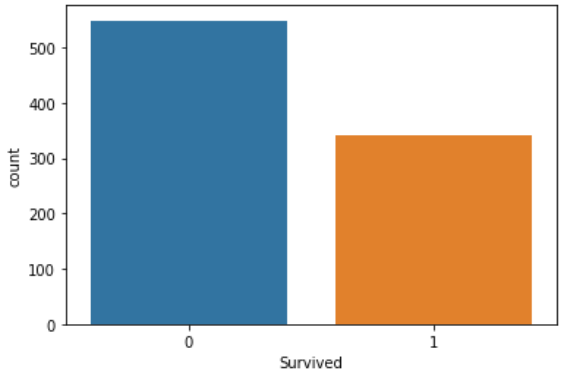
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
Data columns (total 10 columns):
 #   Column    Non-Null Count  Dtype
---  ------    --------------  -----
 0   Survived  891 non-null    int64
 1   Pclass    891 non-null    int64
 2   Name      891 non-null    object
 3   Sex       891 non-null    object
 4   Age       714 non-null    float64
 5   SibSp     891 non-null    int64
 6   Parch     891 non-null    int64
 7   Fare      891 non-null    float64
 8   Cabin     204 non-null    object
 9   Embarked  889 non-null    object
dtypes: float64(2), int64(4), object(4)
memory usage: 69.7+ KB
```

In [23]:
```
train.describe()
```

Out [23]:

	Survived	Pclass	Age	SibSp	Parch	Fare
count	891.000000	891.000000	714.000000	891.000000	891.000000	891.000000
mean	0.383838	2.308642	29.699118	0.523008	0.381594	32.204208
std	0.486592	0.836071	14.526497	1.102743	0.806057	49.693429
min	0.000000	1.000000	0.420000	0.000000	0.000000	0.000000
25%	0.000000	2.000000	20.125000	0.000000	0.000000	7.910400
50%	0.000000	3.000000	28.000000	0.000000	0.000000	14.454200
75%	1.000000	3.000000	38.000000	1.000000	0.000000	31.000000
max	1.000000	3.000000	80.000000	8.000000	6.000000	512.329200

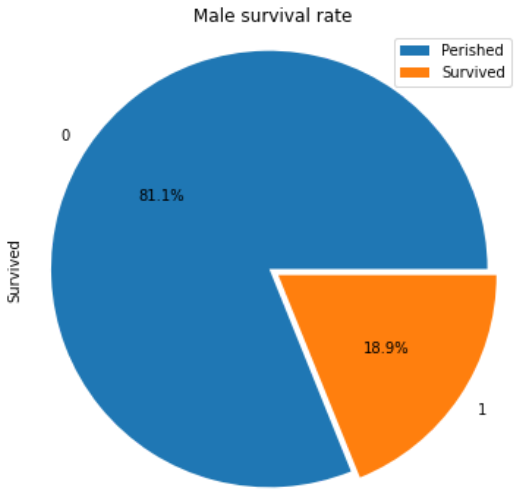
In [24]:
```
sns.countplot(x='Survived', data=train);
```



In [25]:
```
train.groupby(['Survived','Sex'])['Survived'].count()
```

Out [25]:
```
Survived  Sex
0         female     81
          male      468
1         female    233
          male      109
Name: Survived, dtype: int64
```

In [40]:
```
train[train['Sex'] == 'male'].Survived.groupby(train.Survived).count().plot(kind='pie',
plt.axis('equal')
plt.legend(["Perished","Survived"])
plt.title("Male survival rate")
plt.show()
```

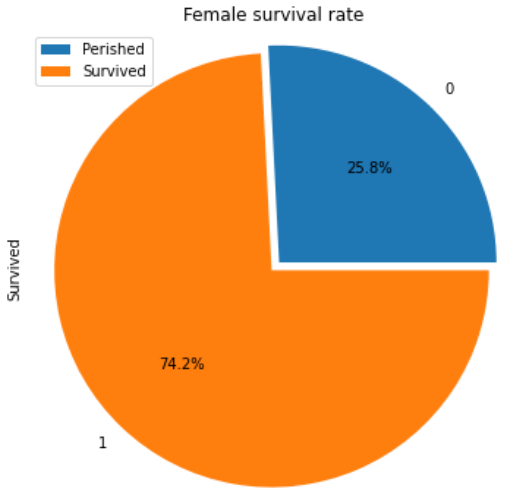


In [ ]:

```
```

In [27]:

```
train[train['Sex'] == 'female'].Survived.groupby(train.Survived).count().plot(kind='pie'
plt.axis('equal')
plt.title("Female survival rate")
plt.legend(["Perished","Survived"])
plt.show()
```



In [ ]:

```
```

In [28]:

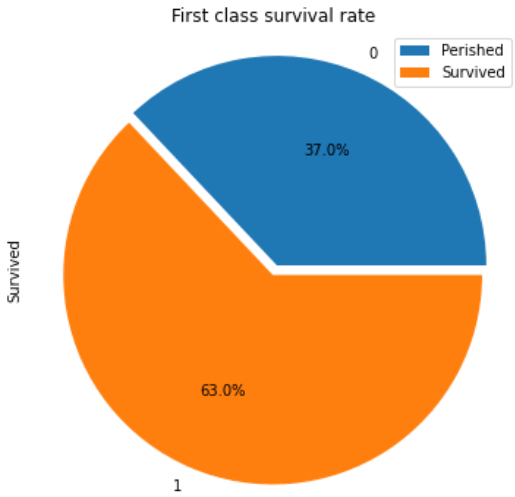
```
pd.crosstab(train.Pclass, train.Survived, margins=True)
```

Out [28]:

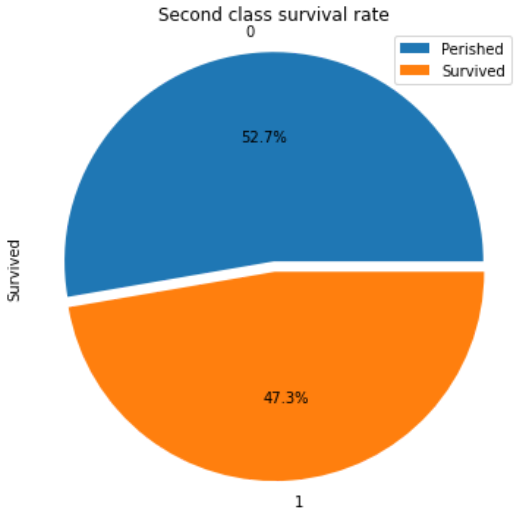
Survived	0	1	All
Pclass			
1	80	136	216
2	97	87	184
3	372	119	491
All	549	342	891

In [29]:

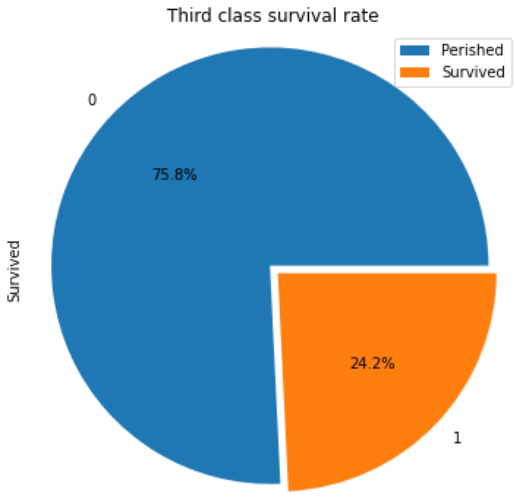
```
train[train['Pclass'] == 1].Survived.groupby(train.Survived).count().plot(kind='pie', fi
plt.axis('equal')
plt.legend(["Perished","Survived"])
plt.title("First class survival rate")
plt.show()
```



In [30]:
```
train[train['Pclass'] == 2].Survived.groupby(train.Survived).count().plot(kind='pie', fi
plt.axis('equal')
plt.legend(["Perished","Survived"])
plt.title("Second class survival rate")
plt.show()
```



In [31]:
```
train[train['Pclass'] == 3].Survived.groupby(train.Survived).count().plot(kind='pie', fi
plt.axis('equal')
plt.legend(["Perished","Survived"])
plt.title("Third class survival rate")
plt.show()
```



In [32]:
```
pd.crosstab([train.Sex, train.Survived], train.Pclass, margins=True)
```

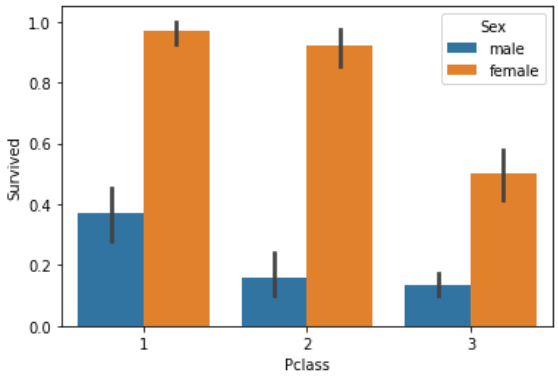
Out [32]:

	Pclass	1	2	3	All
Sex	Survived				
female	0	3	6	72	81
	1	91	70	72	233
male	0	77	91	300	468
	1	45	17	47	109
All		216	184	491	891

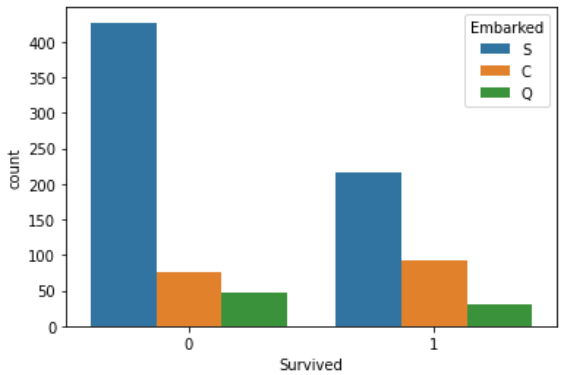
In [33]:
```
sns.barplot('Pclass','Survived',hue='Sex', data=train)
```

```
/home/ihack-pc/.local/lib/python3.8/site-packages/seaborn/_decorators.py:36: FutureWarning: Pass the
following variables as keyword args: x, y. From version 0.12, the only valid positional argument will be
`data`, and passing other arguments without an explicit keyword will result in an error or
misinterpretation.
  warnings.warn(
```

Out [33]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x7f78feefa460>
```



In [34]:
```
sns.countplot(x='Survived', data=train,hue = 'Embarked');
```



In [35]:
```
pd.crosstab([train.Sex, train.Survived], [train.SibSp, train.Pclass], margins=True)
```

Out [35]:

	SibSp	0			1			2			3			4	5	8	All
	Pclass	1	2	3	1	2	3	1	2	3	1	2	3	3	3	3	
Sex	Survived																
female	0	1	3	33	2	3	21	0	0	3	0	0	7	4	1	3	81
	1	48	41	48	38	25	17	3	3	4	2	1	1	2	0	0	233
male	0	59	67	235	16	20	35	1	4	7	1	0	4	11	4	4	468
	1	29	9	35	15	7	10	1	1	1	0	0	0	1	0	0	109
All		137	120	351	71	55	83	5	8	15	3	1	12	18	5	7	891

In [36]:
```
pd.crosstab([train.Sex, train.Survived], [train.Parch, train.Pclass], margins=True)
```

Out [36]:

	Parch	0			1			2			3		4		5	6	All
	Pclass	1	2	3	1	2	3	1	2	3	2	3	1	3	3	3	
Sex	Survived																
female	0	1	5	35	0	1	13	2	0	17	0	1	0	2	3	1	81
	1	63	40	50	17	17	12	11	11	8	2	1	0	0	1	0	233
male	0	63	81	260	10	7	22	3	3	15	0	1	1	1	1	0	468
	1	36	8	36	4	7	8	5	2	3	0	0	0	0	0	0	109
All		163	134	381	31	32	55	21	16	43	2	3	1	3	5	1	891

The above crosstab indicates 2 things:

1. Most of the passerenges didn't had parents onboard and the majority had atmost 1 parent onboard
2. Not much of priority was given to the passengers who had parents onboard in the rescue operation

In [26]:
```
train.corr()
```

Out [26]:

	Survived	Pclass	Age	SibSp	Parch	Fare
Survived	1.000000	-0.338481	-0.077221	-0.035322	0.081629	0.257307
Pclass	-0.338481	1.000000	-0.369226	0.083081	0.018443	-0.549500
Age	-0.077221	-0.369226	1.000000	-0.308247	-0.189119	0.096067
SibSp	-0.035322	0.083081	-0.308247	1.000000	0.414838	0.159651
Parch	0.081629	0.018443	-0.189119	0.414838	1.000000	0.216225
Fare	0.257307	-0.549500	0.096067	0.159651	0.216225	1.000000

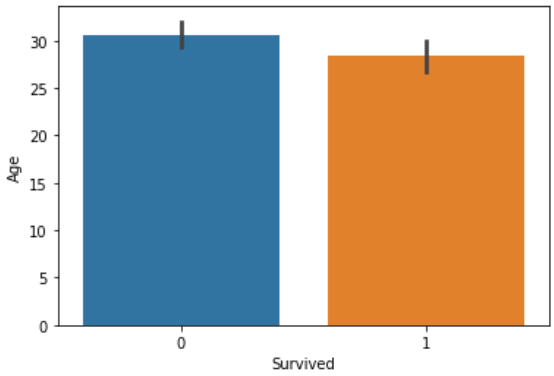
In [27]:
```
train.head(10)
```

Out [27]:

	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Fare	Cabin	Embarked
0	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	7.2500	NaN	S
1	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	71.2833	C85	C
2	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	7.9250	NaN	S
3	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	53.1000	C123	S
4	0	3	Allen, Mr. William Henry	male	35.0	0	0	8.0500	NaN	S
5	0	3	Moran, Mr. James	male	NaN	0	0	8.4583	NaN	Q
6	0	1	McCarthy, Mr. Timothy J	male	54.0	0	0	51.8625	E46	S
7	0	3	Palsson, Master. Gosta Leonard	male	2.0	3	1	21.0750	NaN	S
8	1	3	Johnson, Mrs. Oscar W (Elisabeth Vilhelmina Berg)	female	27.0	0	2	11.1333	NaN	S
9	1	2	Nasser, Mrs. Nicholas (Adele Achem)	female	14.0	1	0	30.0708	NaN	C

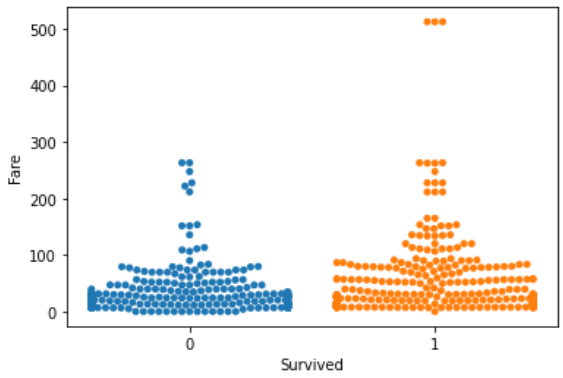
In [41]:
```
sns.barplot(y = "Age",x = "Survived",data = train)
```

Out [41]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x7f78fefa3a90>
```



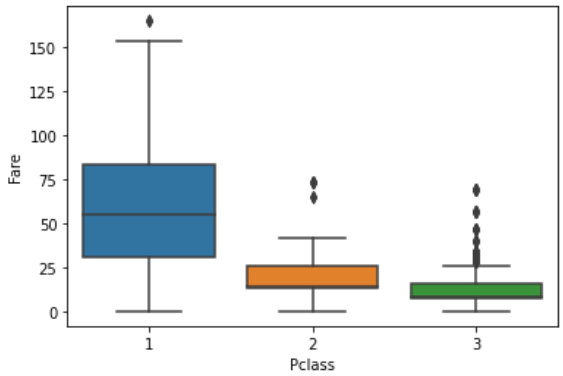
In [29]:
```
sns.swarmplot(x='Survived', y='Fare', data=train)
```

```
/home/ihack-pc/.local/lib/python3.8/site-packages/seaborn/categorical.py:1296: UserWarning: 72.3% of the
points cannot be placed; you may want to decrease the size of the markers or use stripplot.
  warnings.warn(msg, UserWarning)
/home/ihack-pc/.local/lib/python3.8/site-packages/seaborn/categorical.py:1296: UserWarning: 46.5% of the
points cannot be placed; you may want to decrease the size of the markers or use stripplot.
  warnings.warn(msg, UserWarning)
```



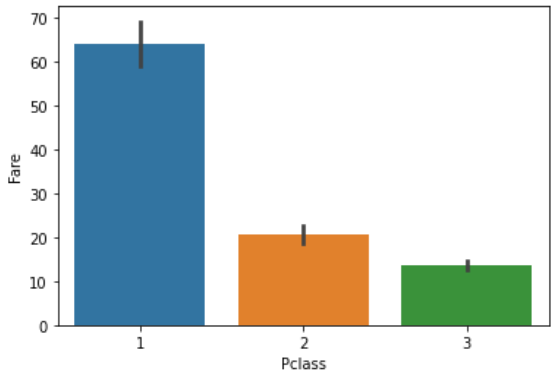
In [30]:
```
sns.boxplot(y = "Fare",x = "Pclass",data = train[train["Fare"] < 200])
```

Out [30]: <matplotlib.axes._subplots.AxesSubplot at 0x7f7a48347df0>



In [31]:
```
sns.barplot(y = "Fare",x = "Pclass",data = train[train["Fare"] < 200])
```

Out [31]: <matplotlib.axes._subplots.AxesSubplot at 0x7f7a48347850>



In [32]:
```
sns.pairplot(train.drop("Name",axis = 1).dropna(),hue = "Survived")
```

Out [32]:
```
<seaborn.axisgrid.PairGrid at 0x7f7a483c0430>
```

In [33]:
```
train.groupby('Survived').describe()['Age']
```

Out [33]:

Survived	count	mean	std	min	25%	50%	75%	max
0	424.0	30.626179	14.172110	1.00	21.0	28.0	39.0	74.0
1	290.0	28.343690	14.950952	0.42	19.0	28.0	36.0	80.0

In [34]:
```
train.head(5)
```

Out [34]:

	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Fare	Cabin	Embarked
0	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	7.2500	NaN	S
1	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	71.2833	C85	C
2	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	7.9250	NaN	S
3	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	53.1000	C123	S
4	0	3	Allen, Mr. William Henry	male	35.0	0	0	8.0500	NaN	S

In [35]:
```
def extract(x):
    temp = x.split(" ")
    if "Mr." in temp:
```

```
        return "Mr"
    elif "Mrs." in temp:
        return "Mrs"
    elif "Miss." in temp:
        return "Miss"
    elif "Master." in temp:
        return "Master"
    elif "Dr." in temp:
        return "Dr"
    else:
        return None
```

In [36]:
```
train["Category"] = train["Name"].apply(extract)
```

In [37]:
```
train.head()
```

Out [37]:

	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Fare	Cabin	Embarked	Category
0	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	7.2500	NaN	S	Mr
1	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	71.2833	C85	C	Mrs
2	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	7.9250	NaN	S	Miss
3	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	53.1000	C123	S	Mrs
4	0	3	Allen, Mr. William Henry	male	35.0	0	0	8.0500	NaN	S	Mr

In [38]:
```
train["Category"].unique()
```

Out [38]:
```
array(['Mr', 'Mrs', 'Miss', 'Master', None, 'Dr'], dtype=object)
```

In [39]:
```
print("Mr." , np.mean(train[train["Category"] == "Mr"]["Age"]))
print("Mrs." , np.mean(train[train["Category"] == "Mrs"]["Age"]))
print("Miss." , np.mean(train[train["Category"] == "Miss"]["Age"]))
print("Master." , np.mean(train[train["Category"] == "Master"]["Age"]))
print("Dr." , np.mean(train[train["Category"] == "Dr"]["Age"]))
```

```
Mr. 32.368090452261306
Mrs. 35.898148148148145
Miss. 21.773972602739725
Master. 4.574166666666667
Dr. 42.0
```