In [280]:

```
import pandas as pd
import numpy as np
import seaborn as sns
import warnings
warnings.filterwarnings("ignore")
import matplotlib.pyplot as plt
```

In [281]:

```
train= pd.read_csv(r"C:\Users\Ravi\Downloads\titanic\train.csv")
```

In [282]:

```
train.head()
```

Out[282]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabi
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500	Na
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2833	C8
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9250	Na
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1000	C12
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	Na

```
In [283]: train.describe(include="all")
```

Out[283]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch
count	891.000000	891.000000	891.000000	891	891	714.000000	891.000000	891.00000
unique	NaN	NaN	NaN	891	2	NaN	NaN	Na
top	NaN	NaN	NaN	Andersson, Miss. Ingeborg Constanzia	male	NaN	NaN	Na
freq	NaN	NaN	NaN	1	577	NaN	NaN	Na
mean	446.000000	0.383838	2.308642	NaN	NaN	29.699118	0.523008	0.381594
std	257.353842	0.486592	0.836071	NaN	NaN	14.526497	1.102743	0.806057
min	1.000000	0.000000	1.000000	NaN	NaN	0.420000	0.000000	0.00000
25%	223.500000	0.000000	2.000000	NaN	NaN	20.125000	0.000000	0.00000
50%	446.000000	0.000000	3.000000	NaN	NaN	28.000000	0.000000	0.00000
75%	668.500000	1.000000	3.000000	NaN	NaN	38.000000	1.000000	0.00000
max	891.000000	1.000000	3.000000	NaN	NaN	80.000000	8.000000	6.00000

```
In [284]: train.columns

Out[284]: Index(['PassengerId', 'Survived', 'Pclass', 'Name', 'Sex', 'Age', 'SibSp',
                 'Parch', 'Ticket', 'Fare', 'Cabin', 'Embarked'],
                dtype='object')
```

```
In [285]: x= train.drop("Survived",axis=1)
```

```
In [286]: y= train["Survived"]
```

```
In [287]: from sklearn.model_selection import train_test_split
```

```
In [288]: train_x, test_x, train_y, test_y = train_test_split(x,y,random_state = 40, strati
```

```
In [289]: train_x.shape

Out[289]: (668, 11)
```

```
In [290]: test_x.shape

Out[290]: (223, 11)
```

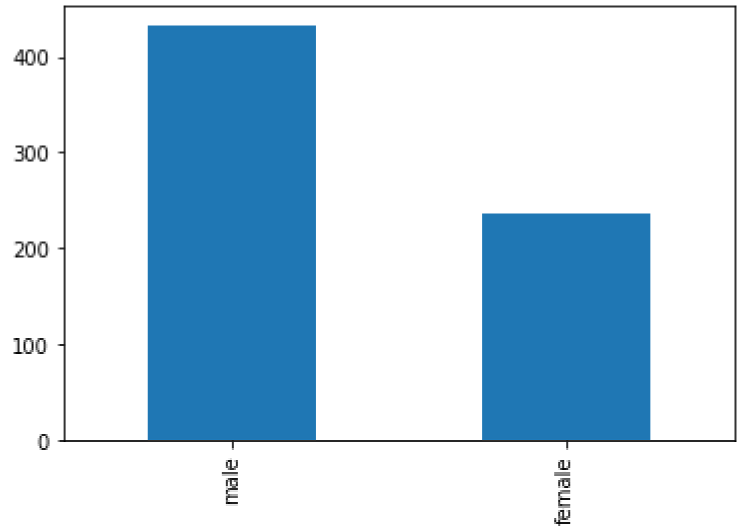
Univariate Analysis

In [291]:
```
train_x["Sex"].value_counts()
```

Out[291]:
```
male      432
female    236
Name: Sex, dtype: int64
```

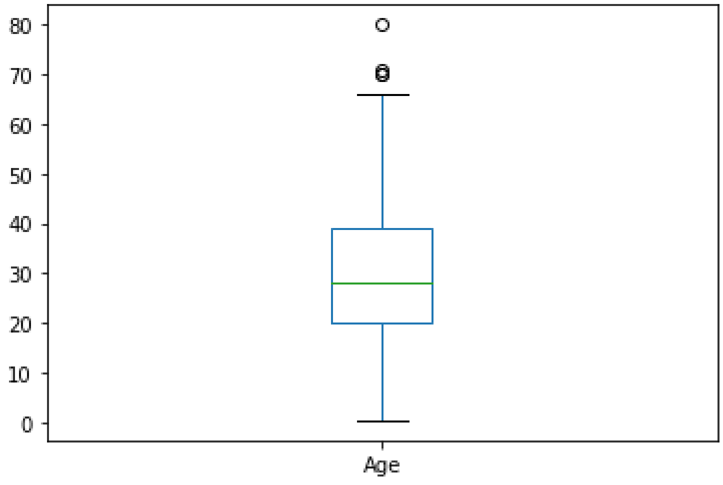
In [292]:
```
train_x["Sex"].value_counts().plot(kind="bar")
```

Out[292]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x16135893b08>
```



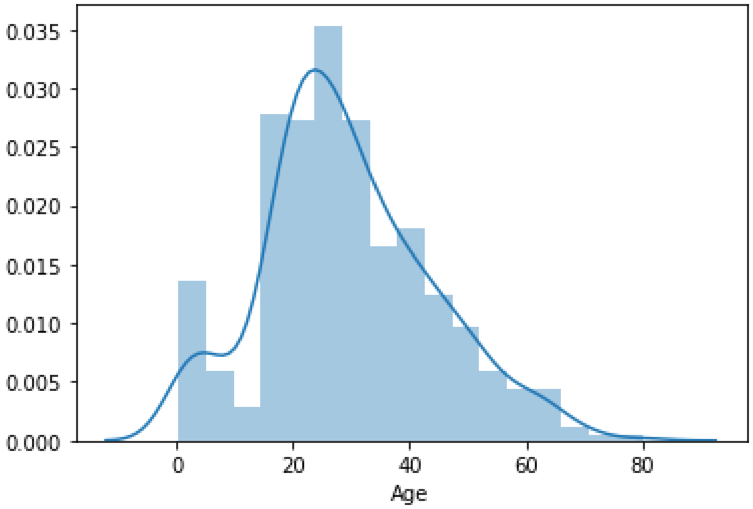
In [293]:
```
train_x["Age"].plot.box()
```

Out[293]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x161381f3dc8>
```



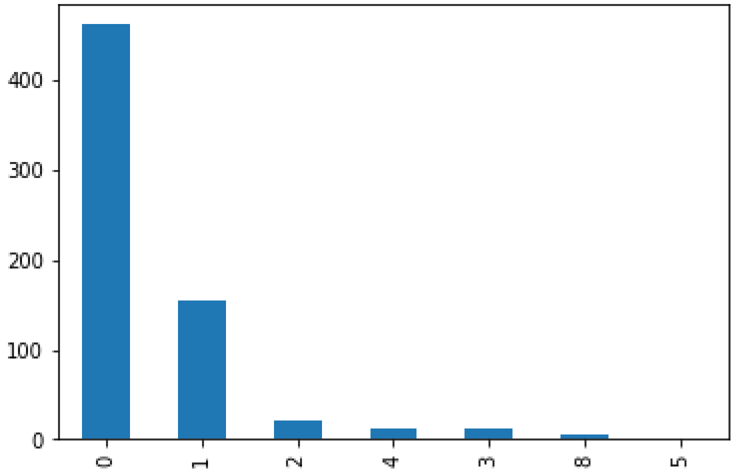
```
In [294]: sns.distplot(train_x["Age"], hist = True, kde=True)
```

```
Out[294]: <matplotlib.axes._subplots.AxesSubplot at 0x16138258a48>
```



```
In [295]: train_x["SibSp"].value_counts().plot.bar()
```

```
Out[295]: <matplotlib.axes._subplots.AxesSubplot at 0x161382e3d08>
```

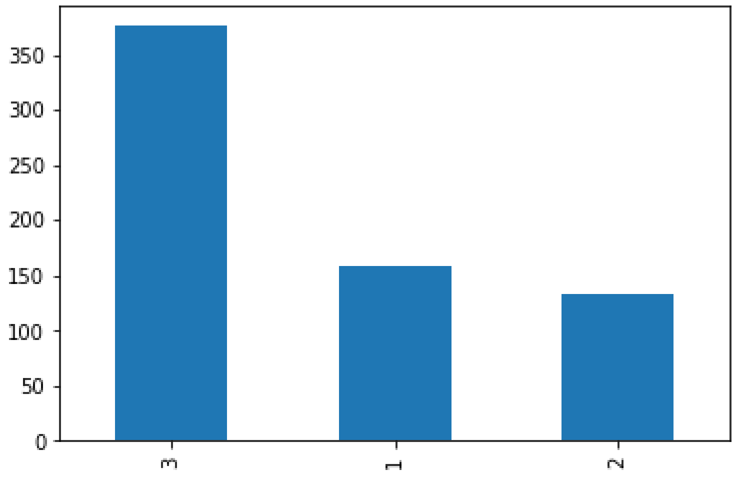


```
In [296]: train_x["Pclass"].value_counts()
```

```
Out[296]: 3    376
          1    158
          2    134
          Name: Pclass, dtype: int64
```

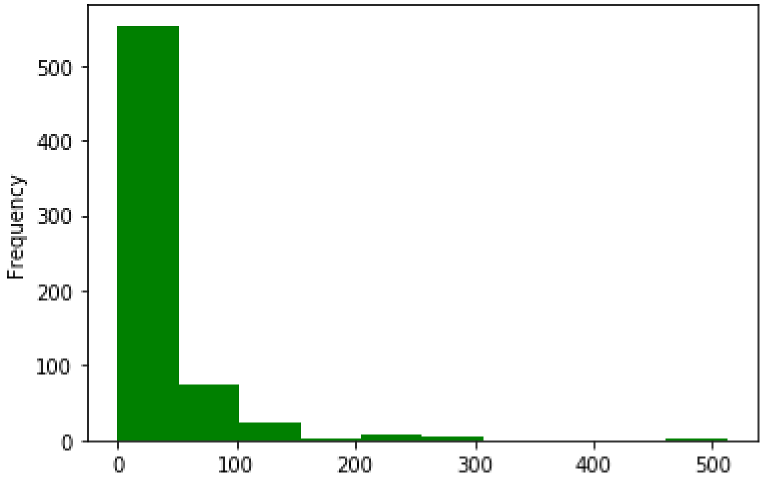
In [297]:
```
train_x["Pclass"].value_counts().plot.bar()
```

Out[297]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x16138363448>
```



In [298]:
```
train_x["Fare"].plot.hist(color="Green")
```

Out[298]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x161383bfd48>
```



In [299]:
```
train_x["Cabin"].value_counts().sum()
```

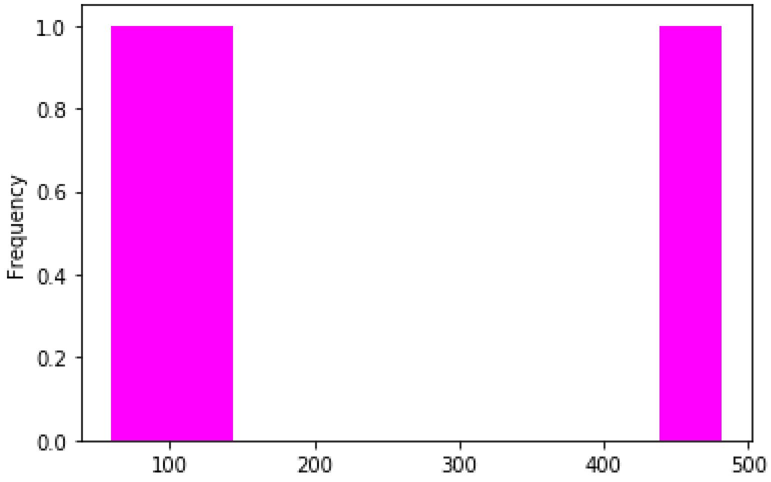
Out[299]:
```
147
```

In [300]:
```
train_x["Cabin"].isna().value_counts()
```

Out[300]:
```
True     521
False    147
Name: Cabin, dtype: int64
```

In [301]:
```
train_x["Embarked"].value_counts().plot.hist(color= "Magenta")
```

Out[301]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x16138431348>
```



Checking for missing values

In [302]:
```
train_x.isnull().sum()
```

Out[302]:
```
PassengerId      0
Pclass           0
Name             0
Sex              0
Age            136
SibSp            0
Parch            0
Ticket           0
Fare             0
Cabin          521
Embarked         1
dtype: int64
```

Therefore values from "Age" and "Cabin" are missing, which are needed to be taken care of.

In [303]:
```
mn= train["Age"].mean()
```

In [304]:
```
train["Age"]=train_x["Age"].replace(np.nan,mn,inplace = True)
```

Here new methods has to checked after building the model.

1. Dropping the rows
2. Creating a new dimension

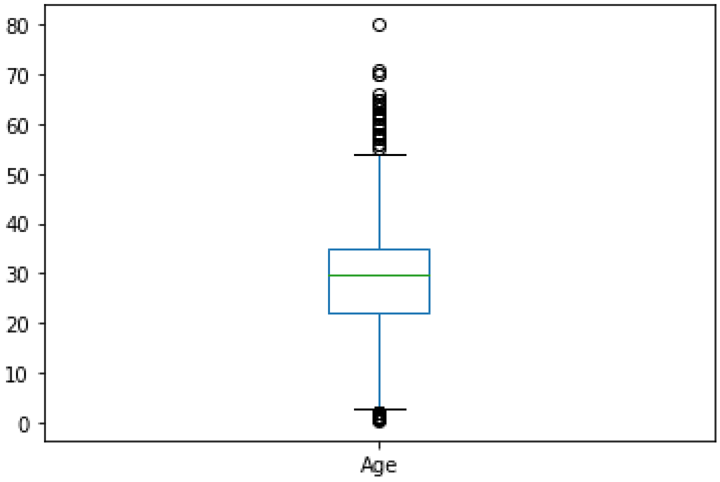
In [305]:
```
train_x.head()
```

Out[305]:

	PassengerId	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin
660	661	1	Frauenthal, Dr. Henry William	male	50.000000	2	0	PC 17611	133.6500	NaN
576	577	2	Garside, Miss. Ethel	female	34.000000	0	0	243880	13.0000	NaN
158	159	3	Smiljanic, Mr. Mile	male	29.699118	0	0	315037	8.6625	NaN
617	618	3	Lobb, Mrs. William Arthur (Cordelia K Stanlick)	female	26.000000	1	0	A/5. 3336	16.1000	NaN
407	408	2	Richards, Master. William Rowe	male	3.000000	1	1	29106	18.7500	NaN

In [306]:
```
train_x["Age"].plot.box()
```

Out[306]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x1613846c188>
```



Bivariate Analysis

In [307]:
```
train_x.shape
```

Out[307]:
```
(668, 11)
```

In [308]:
```
test_x.shape
```

Out[308]:
```
(223, 11)
```

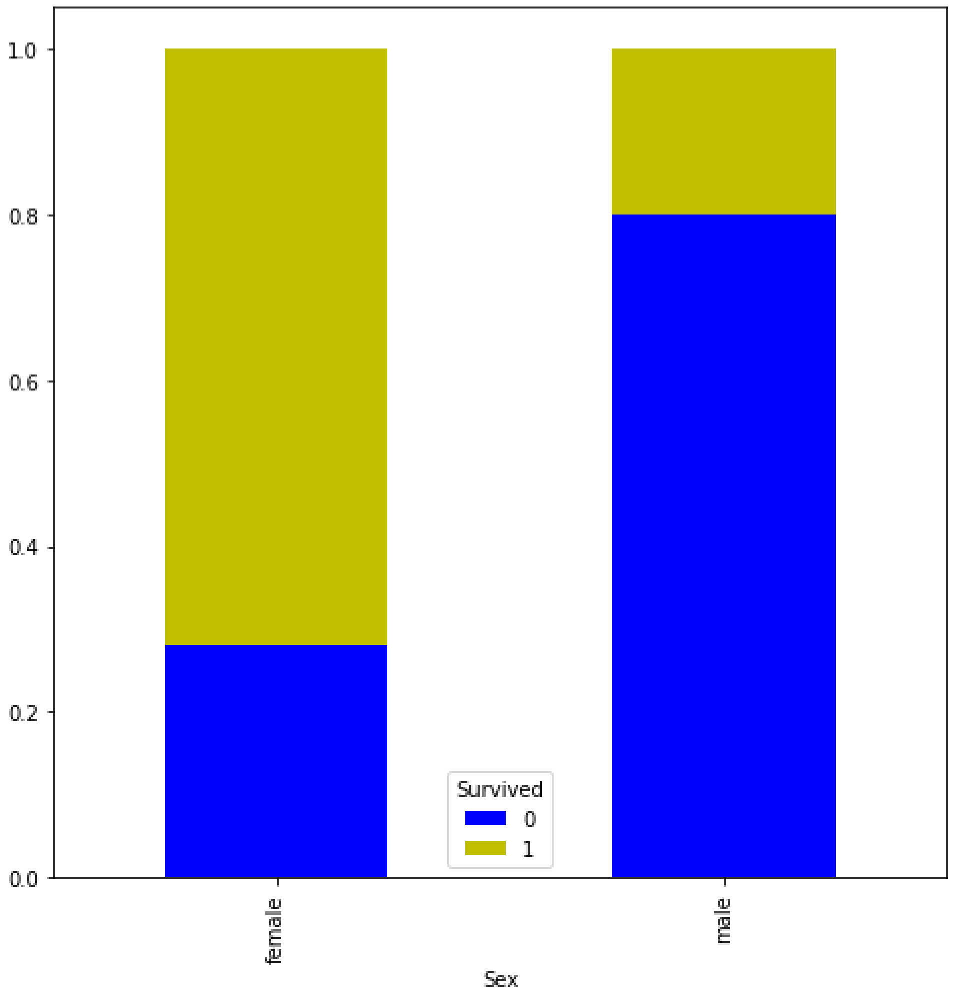
In [309]:
```
train.columns
```

Out[309]:
```
Index(['PassengerId', 'Survived', 'Pclass', 'Name', 'Sex', 'Age', 'SibSp',
       'Parch', 'Ticket', 'Fare', 'Cabin', 'Embarked'],
      dtype='object')
```

In [310]:
```
sex_sur=pd.crosstab(train_x["Sex"],train_y)
```

In [311]:
```
sex_sur.div(sex_sur.sum(1).astype(float),axis=0).plot.bar(stacked=True, figsize=(
```

Out[311]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x161384da2c8>
```

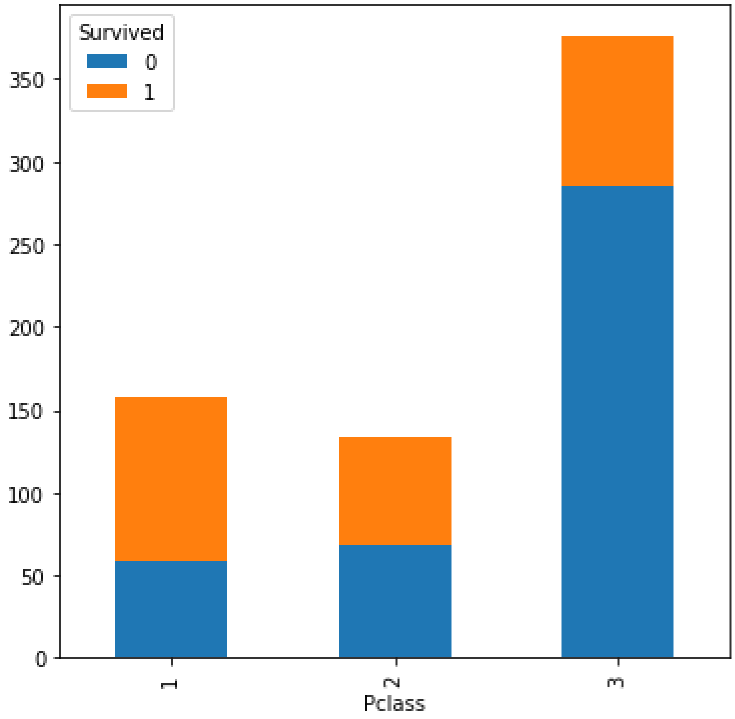


Chances of female survival are more than the males

In [312]:
```
p_sur=pd.crosstab(train_x["Pclass"],train_y)
```

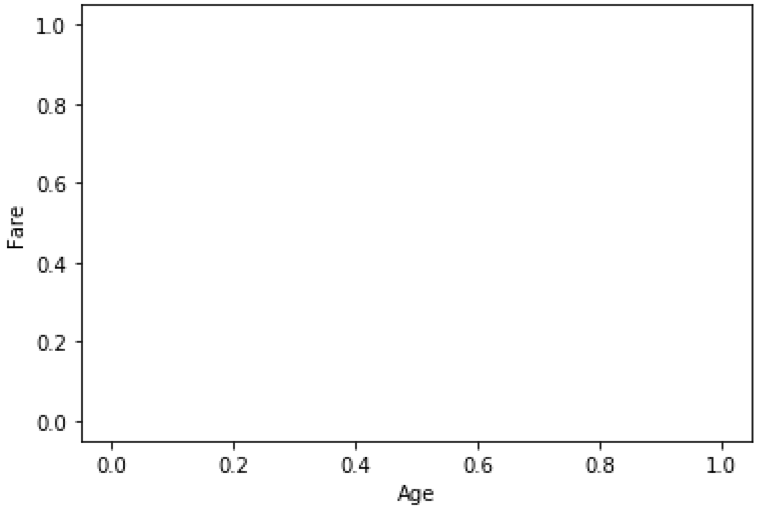
```
In [313]: p_sur.plot.bar(stacked=True,figsize=(6,6))
```

```
Out[313]: <matplotlib.axes._subplots.AxesSubplot at 0x1613854e208>
```



```
In [314]: age_fare=pd.crosstab(train_x["Age"],train_x["Fare"])
```

```
In [315]: train.plot.scatter("Age","Fare")
          plt.show()
```



In [316]:

```
train_x["Age"].dtype
```

Out[316]:

```
dtype('float64')
```

In [317]:

```
#age Fare relation
train["Age"].corr(train_x["Fare"])
```

Out[317]:

```
nan
```

Therefore Age and Fare are not much related.

In [318]:

```
#Age and survival
train_x["Age"].corr(train_y)
```

Out[318]:

```
-0.10188494983187488
```

In [319]:

```
#fare and survival
train_x["Fare"].corr(train_y)
```

Out[319]:

```
0.25569898233277427
```

In [320]:

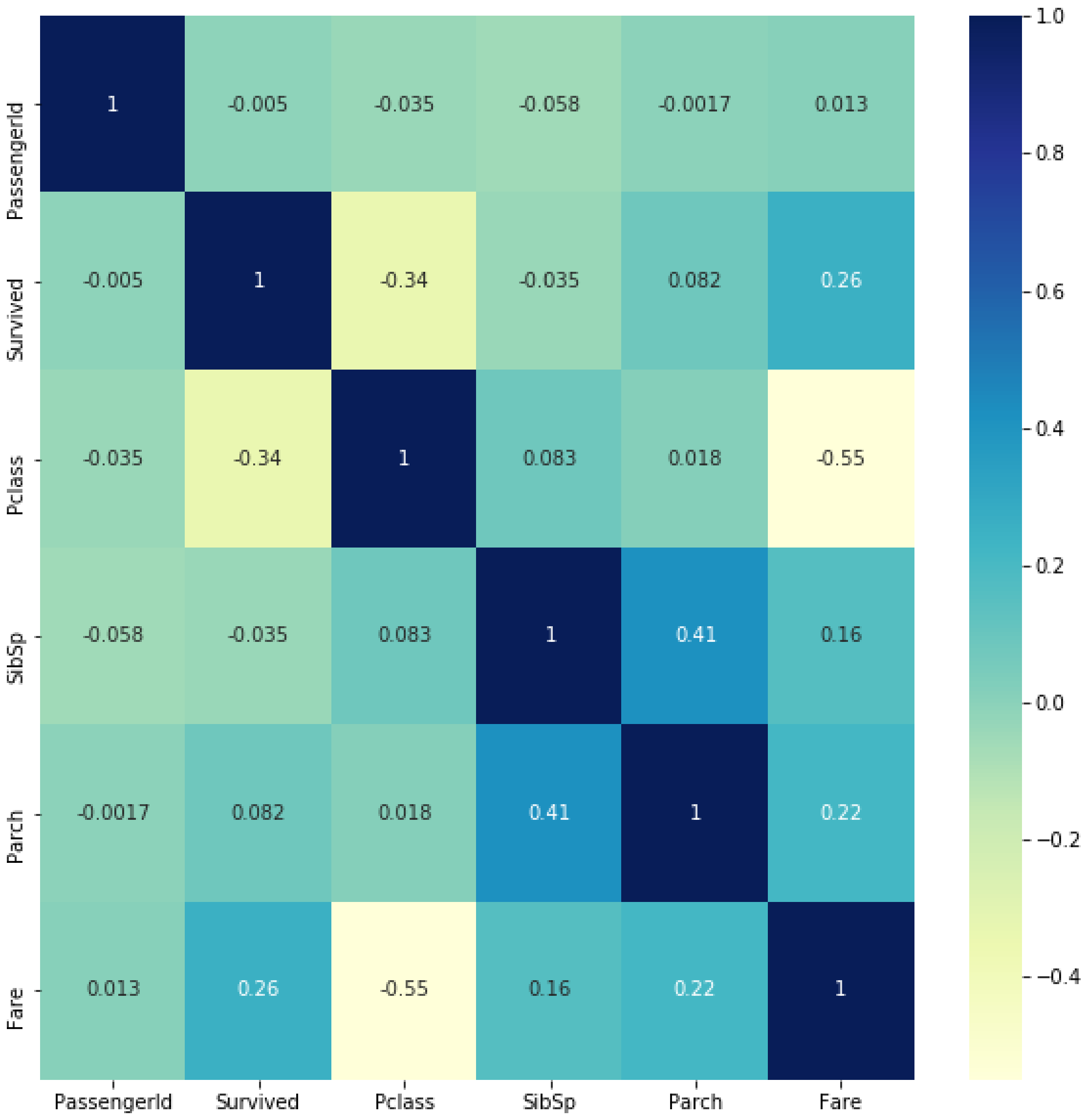
```
train_x["Pclass"].corr(train_y)
```

Out[320]:

```
-0.3386341552390735
```

In [321]:
```
corr= train.corr()
fig,ax=plt.subplots()
fig.set_size_inches(10,10)
sns.heatmap(corr,annot=True,cmap="YlGnBu")
```

Out[321]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x1613863eec8>
```



	PassengerId	Survived	Pclass	SibSp	Parch	Fare
PassengerId	1	-0.005	-0.035	-0.058	-0.0017	0.013
Survived	-0.005	1	-0.34	-0.035	0.082	0.26
Pclass	-0.035	-0.34	1	0.083	0.018	-0.55
SibSp	-0.058	-0.035	0.083	1	0.41	0.16
Parch	-0.0017	0.082	0.018	0.41	1	0.22
Fare	0.013	0.26	-0.55	0.16	0.22	1

Model Building

Logistic Regression

In [ ]:

In [322]:

```
trainn=train.drop(["Survived"],axis=1)
trainn=train.drop(["Cabin"],axis=1)
target=train["Survived"]
```

In [323]:

```
trainn=pd.get_dummies(trainn)
```

In [324]:

```
trainn.head()
```

Out[324]:

	PassengerId	Survived	Pclass	SibSp	Parch	Fare	Name_Abbing, Mr. Anthony	Name_Abbott, Mr. Rossmore Edward	Name_Ab Mrs. Sta (Rosa H
0	1	0	3	1	0	7.2500	0	0	
1	2	1	1	1	0	71.2833	0	0	
2	3	1	3	0	0	7.9250	0	0	
3	4	1	1	1	0	53.1000	0	0	
4	5	0	3	0	0	8.0500	0	0	

5 rows × 1583 columns

In [325]:

```
train.columns
```

Out[325]:

```
Index(['PassengerId', 'Survived', 'Pclass', 'Name', 'Sex', 'Age', 'SibSp',
       'Parch', 'Ticket', 'Fare', 'Cabin', 'Embarked'],
      dtype='object')
```

In [326]:

```
trainn=trainn.drop(["Survived"],axis=1)
```

In [327]:
```
trainn.head()
```

Out[327]:

	PassengerId	Pclass	SibSp	Parch	Fare	Name_Abbing, Mr. Anthony	Name_Abbott, Mr. Rossmore Edward	Name_Abbott, Mrs. Stanton (Rosa Hunt)	Nam
0	1	3	1	0	7.2500	0	0	0	
1	2	1	1	0	71.2833	0	0	0	
2	3	3	0	0	7.9250	0	0	0	
3	4	1	1	0	53.1000	0	0	0	
4	5	3	0	0	8.0500	0	0	0	

5 rows × 1582 columns

In [328]:
```
target.head()
```

Out[328]:
```
0    0
1    1
2    1
3    1
4    0
Name: Survived, dtype: int64
```

In [329]:
```
train_X,test_X,train_Y,test_Y = train_test_split(trainn,target,test_size=0.3,rand
```

In [330]:
```
from sklearn.linear_model import LogisticRegression
```

In [331]:
```
lrg=LogisticRegression()
```

In [332]:
```
test_X.head()
```

Out[332]:

	PassengerId	Pclass	SibSp	Parch	Fare	Name_Abbing, Mr. Anthony	Name_Abbott, Mr. Rossmore Edward	Name_Abbott, Mrs. Stanton (Rosa Hunt)	Na
646	647	3	0	0	7.8958	0	0	0	
876	877	3	0	0	9.8458	0	0	0	
359	360	3	0	0	7.8792	0	0	0	
194	195	1	0	0	27.7208	0	0	0	
819	820	3	3	2	27.9000	0	0	0	

5 rows × 1582 columns

```
In [333]: lrg.fit(train_X,train_Y)
```

```
Out[333]: LogisticRegression(C=1.0, class_weight=None, dual=False, fit_intercept=True,
                             intercept_scaling=1, l1_ratio=None, max_iter=100,
                             multi_class='auto', n_jobs=None, penalty='l2',
                             random_state=None, solver='lbfgs', tol=0.0001, verbose=0,
                             warm_start=False)
```

```
In [334]: pred=lrg.predict(test_X)
```

```
In [335]: pred.shape
```

```
Out[335]: (268,)
```

```
In [336]: from sklearn.metrics import accuracy_score
```

```
In [337]: accuracy_score(test_Y,pred)
```

```
Out[337]: 0.8134328358208955
```

Decision Tree

```
In [338]: from sklearn.tree import DecisionTreeClassifier
```

```
In [339]: clf=DecisionTreeClassifier(max_depth=16,random_state=40)
```

```
In [340]: clf.fit(train_X,train_Y)
```

```
Out[340]: DecisionTreeClassifier(ccp_alpha=0.0, class_weight=None, criterion='gini',
                                 max_depth=16, max_features=None, max_leaf_nodes=None,
                                 min_impurity_decrease=0.0, min_impurity_split=None,
                                 min_samples_leaf=1, min_samples_split=2,
                                 min_weight_fraction_leaf=0.0, presort='deprecated',
                                 random_state=40, splitter='best')
```

```
In [341]: pred1=clf.predict(test_X)
```

```
In [342]: accuracy_score(test_Y,pred1)
```

```
Out[342]: 0.8507462686567164
```

After tuning the parameters a an accuracy of 85.07% is achieved.

```
In [343]: #predicting on training data set
          pre=clf.predict(train_X)
```

In [344]:

```
accuracy_score(train_Y,pre)
```

Out[344]:

```
0.9775280898876404
```

On predicting on the dataset an accuracy of 97.75% is achieved.

In [ ]:

```

```

Working with Test Data Set

In [345]:

```
test_set=pd.read_csv(r"C:\Users\Ravi\Downloads\titanic\test.csv")
```

In [346]:

```
test_set.head()
```

Out[346]:

	PassengerId	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarke
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 [347]:

```
test_set["Age"].replace(np.nan,mn,inplace=True)
```

In [348]:

```
test_set.drop(["Cabin"],axis=1,inplace= True)
```

In [349]:

```
test1=pd.get_dummies(test_set)
```

In [350]:

```
test_set[test_set["Fare"].isna()]= 8
```

```
In [351]: test_set.isna().sum()

Out[351]: PassengerId    0
          Pclass         0
          Name           0
          Sex            0
          Age            0
          SibSp          0
          Parch          0
          Ticket         0
          Fare           0
          Embarked       0
          dtype: int64

In [ ]:

In [352]: train_X.shape

Out[352]: (623, 1582)

In [353]: test1.shape

Out[353]: (418, 792)

In [354]: train.columns

Out[354]: Index(['PassengerId', 'Survived', 'Pclass', 'Name', 'Sex', 'Age', 'SibSp',
                 'Parch', 'Ticket', 'Fare', 'Cabin', 'Embarked'],
                dtype='object')

In [355]: test_set.columns

Out[355]: Index(['PassengerId', 'Pclass', 'Name', 'Sex', 'Age', 'SibSp', 'Parch',
                 'Ticket', 'Fare', 'Embarked'],
                dtype='object')
```

New Attempt

In [356]:
```
train.head()
```

Out[356]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cab
0	1	0	3	Braund, Mr. Owen Harris	male	None	1	0	A/5 21171	7.2500	Na
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	None	1	0	PC 17599	71.2833	C
2	3	1	3	Heikkinen, Miss. Laina	female	None	0	0	STON/O2. 3101282	7.9250	Na
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	None	1	0	113803	53.1000	C1
4	5	0	3	Allen, Mr. William Henry	male	None	0	0	373450	8.0500	Na

In [ ]:

In [357]:
```
features=["Pclass","Sex","Age","SibSp","Parch","Fare","Embarked"]
```

In [358]:
```
df=train[features]
```

In [359]:
```
df.head()
```

Out[359]:

	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked
0	3	male	None	1	0	7.2500	S
1	1	female	None	1	0	71.2833	C
2	3	female	None	0	0	7.9250	S
3	1	female	None	1	0	53.1000	S
4	3	male	None	0	0	8.0500	S

In [360]:
```
df["Age"].replace(np.nan,mn,inplace=True)
```

In [361]:
```
df.shape
```

Out[361]:
```
(891, 7)
```

In [362]:
```
df1=pd.get_dummies(df)
```

In [363]:
```
df1.head()
```

Out[363]:

	Pclass	Age	SibSp	Parch	Fare	Sex_female	Sex_male	Embarked_C	Embarked_Q	E
0	3	29.699118	1	0	7.2500	0	1	0	0	
1	1	29.699118	1	0	71.2833	1	0	1	0	
2	3	29.699118	0	0	7.9250	1	0	0	0	
3	1	29.699118	1	0	53.1000	1	0	0	0	
4	3	29.699118	0	0	8.0500	0	1	0	0	

In [364]:
```
df1.shape
```

Out[364]:
```
(891, 10)
```

In [365]:
```
trn_x,tst_x,trn_y,tst_y=train_test_split(df1,target,test_size=0.3)
```

In [366]:
```
from sklearn.pipeline import Pipeline
from sklearn.preprocessing import StandardScaler
from sklearn.preprocessing import PolynomialFeatures
```

In [447]:
```
Input=[("scale",StandardScaler()),("polynomial",PolynomialFeatures(degree=2,inclu
```

In [448]:
```
pipe=Pipeline(Input)
```

In [449]:
```
pipe.fit(trn_x,trn_y)
```

Out[449]:
```
Pipeline(memory=None,
         steps=[('scale',
                 StandardScaler(copy=True, with_mean=True, with_std=True)),
                ('polynomial',
                 PolynomialFeatures(degree=2, include_bias=False,
                                    interaction_only=False, order='C')),
                ('mode',
                 LogisticRegression(C=1.0, class_weight=None, dual=False,
                                    fit_intercept=True, intercept_scaling=1,
                                    l1_ratio=None, max_iter=100,
                                    multi_class='auto', n_jobs=1, penalty='l2',
                                    random_state=10, solver='lbfgs', tol=0.000
1,
                                    verbose=0, warm_start=False))],
         verbose=False)
```

In [450]:
```
pred_val=pipe.predict(tst_x)
```