```
#logisitic regression  is a supervised classification algorithm.Although the name says regression, this is a logistic regression and henc


#X-indepndent variables (sepal length,sepal width,petal length,petal width)
#y dependent variable - y  is a categorical variable (species)


#sigmoid function is the activation function 1/1+e^-x


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


dataset=pd.read_csv("IRIS_R1.csv")
dataset.describe()
```

	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm
count	150.000000	150.000000	150.000000	150.000000
mean	5.843333	3.054000	3.758667	1.198667
std	0.828066	0.433594	1.764420	0.763161
min	4.300000	2.000000	1.000000	0.100000
25%	5.100000	2.800000	1.600000	0.300000
50%	5.800000	3.000000	4.350000	1.300000
75%	6.400000	3.300000	5.100000	1.800000
max	7.900000	4.400000	6.900000	2.500000

```
x=dataset.iloc[:,[0,1,2,3]].values


y=dataset.iloc[:,4].values
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.25,random_state=0)


from sklearn.preprocessing import StandardScaler
sc=StandardScaler()
x_train=sc.fit_transform(x_train)
x_test=sc.transform(x_test)



#fitting the logistic regression on the training data
from sklearn.linear_model import LogisticRegression
classifier=LogisticRegression(random_state=0,solver='lbfgs',multi_class='auto')
classifier.fit(x_train,y_train)
```

```
     LogisticRegression(random_state=0)
```

```
#logistic regrssion with test data
y_pred=classifier.predict(x_test)
#predict probabilites
probs_y=classifier.predict_proba(x_test)

probs_y=np.round(probs_y,2)

res="{:<10} | {:<10} | {:<10} | {:<13} | {:<5}".format("y_test","y_pred","Setosa(%)","versicolor(%)","virginica(%)\n")
res+="-"*65+"\n"
res+="\n".join("{:<10} | {:<10} | {:<10} | {:<13} | {:<10}".format(x,y,a,b,c)for x,y,a,b,c in zip(y_test,y_pred,probs_y[:,0],probs_y[:,1]
res+="\n"+"-"*65+"\n"
print(res)
```

```
     y_test     | y_pred     | Setosa(%)  | versicolor(%) | virginica(%)
     -----------------------------------------------------------------
     Iris-virginica | Iris-virginica | 0.0        | 0.03          | 0.97
     Iris-versicolor | Iris-versicolor | 0.01       | 0.95          | 0.04
     Iris-setosa | Iris-setosa | 1.0        | 0.0           | 0.0
     Iris-virginica | Iris-virginica | 0.0        | 0.08          | 0.92
     Iris-setosa | Iris-setosa | 0.98       | 0.02          | 0.0
     Iris-virginica | Iris-virginica | 0.0        | 0.01          | 0.99
     Iris-setosa | Iris-setosa | 0.98       | 0.02          | 0.0
     Iris-versicolor | Iris-versicolor | 0.01       | 0.71          | 0.28
     Iris-versicolor | Iris-versicolor | 0.0        | 0.73          | 0.27
     Iris-versicolor | Iris-versicolor | 0.02       | 0.89          | 0.08
```

```
Iris-virginica | Iris-virginica | 0.0        | 0.44          | 0.56
Iris-versicolor | Iris-versicolor | 0.02       | 0.76          | 0.22
Iris-versicolor | Iris-versicolor | 0.01       | 0.85          | 0.13
Iris-versicolor | Iris-versicolor | 0.0        | 0.69          | 0.3
Iris-versicolor | Iris-versicolor | 0.01       | 0.75          | 0.24
Iris-setosa | Iris-setosa | 0.95       | 0.05          | 0.0
Iris-versicolor | Iris-versicolor | 0.02       | 0.72          | 0.26
Iris-versicolor | Iris-versicolor | 0.03       | 0.86          | 0.11
Iris-setosa | Iris-setosa | 0.94       | 0.06          | 0.0
Iris-setosa | Iris-setosa | 0.99       | 0.01          | 0.0
Iris-virginica | Iris-virginica | 0.0        | 0.17          | 0.83
Iris-versicolor | Iris-versicolor | 0.04       | 0.71          | 0.25
Iris-setosa | Iris-setosa | 0.98       | 0.02          | 0.0
Iris-setosa | Iris-setosa | 0.96       | 0.04          | 0.0
Iris-virginica | Iris-virginica | 0.0        | 0.35          | 0.65
Iris-setosa | Iris-setosa | 1.0        | 0.0           | 0.0
Iris-setosa | Iris-setosa | 0.99       | 0.01          | 0.0
Iris-versicolor | Iris-versicolor | 0.02       | 0.87          | 0.11
Iris-versicolor | Iris-versicolor | 0.09       | 0.9           | 0.02
Iris-setosa | Iris-setosa | 0.97       | 0.03          | 0.0
Iris-virginica | Iris-virginica | 0.0        | 0.21          | 0.79
Iris-versicolor | Iris-versicolor | 0.06       | 0.69          | 0.25
Iris-setosa | Iris-setosa | 0.98       | 0.02          | 0.0
Iris-virginica | Iris-virginica | 0.0        | 0.35          | 0.65
Iris-virginica | Iris-virginica | 0.0        | 0.04          | 0.96
Iris-versicolor | Iris-versicolor | 0.07       | 0.81          | 0.11
Iris-setosa | Iris-setosa | 0.97       | 0.03          | 0.0
Iris-versicolor | Iris-virginica | 0.0        | 0.42          | 0.58
----------------------------------------------------------------
```

```
from sklearn.metrics import confusion_matrix
cm=confusion_matrix(y_test,y_pred)
print(cm)
```

```
[[13  0  0]
 [ 0 15  1]
 [ 0  0  9]]
```