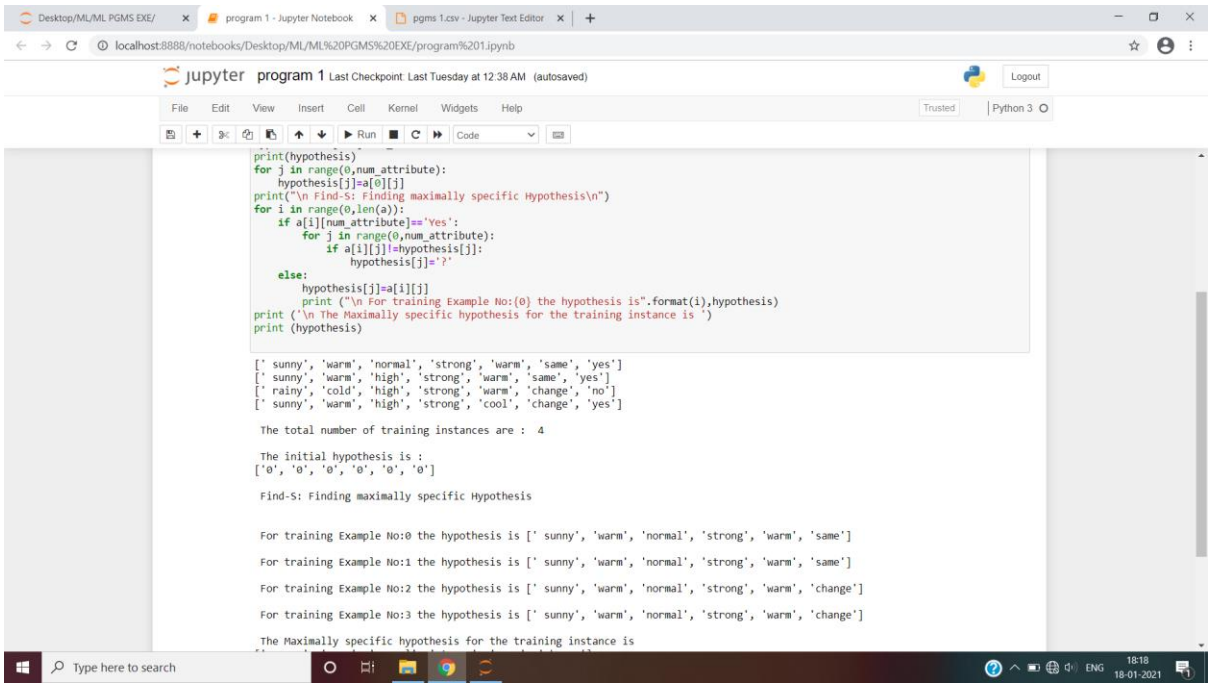
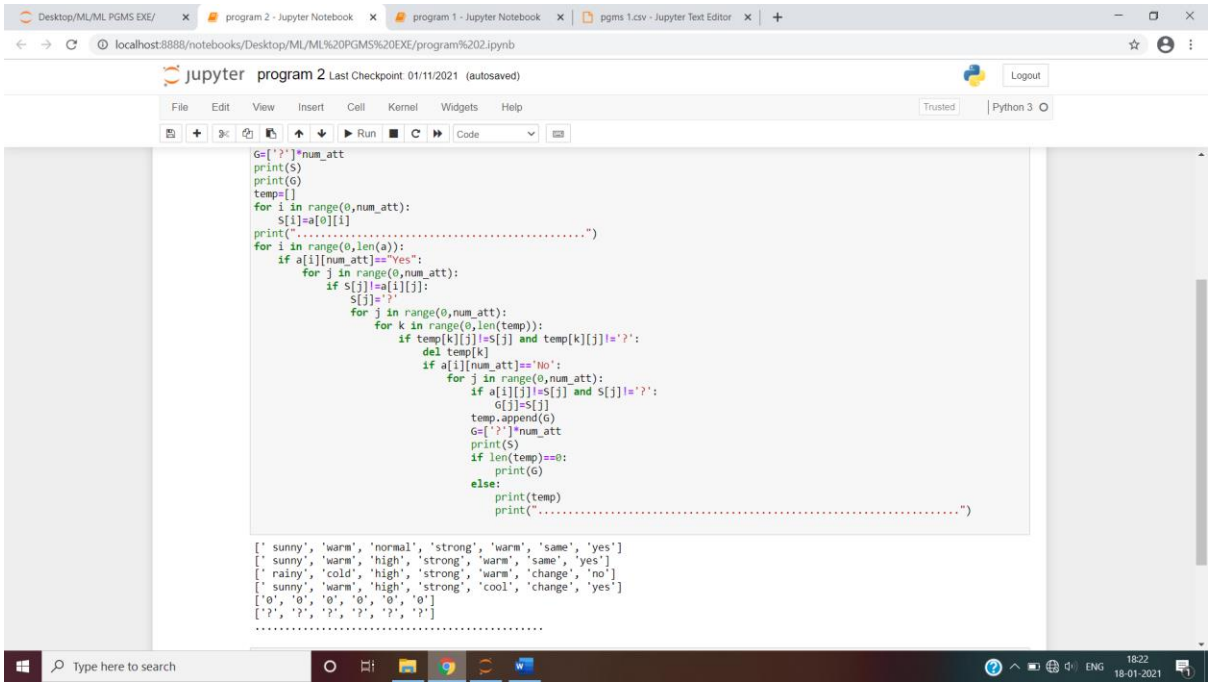
ML PROGRAMS OUTPUT

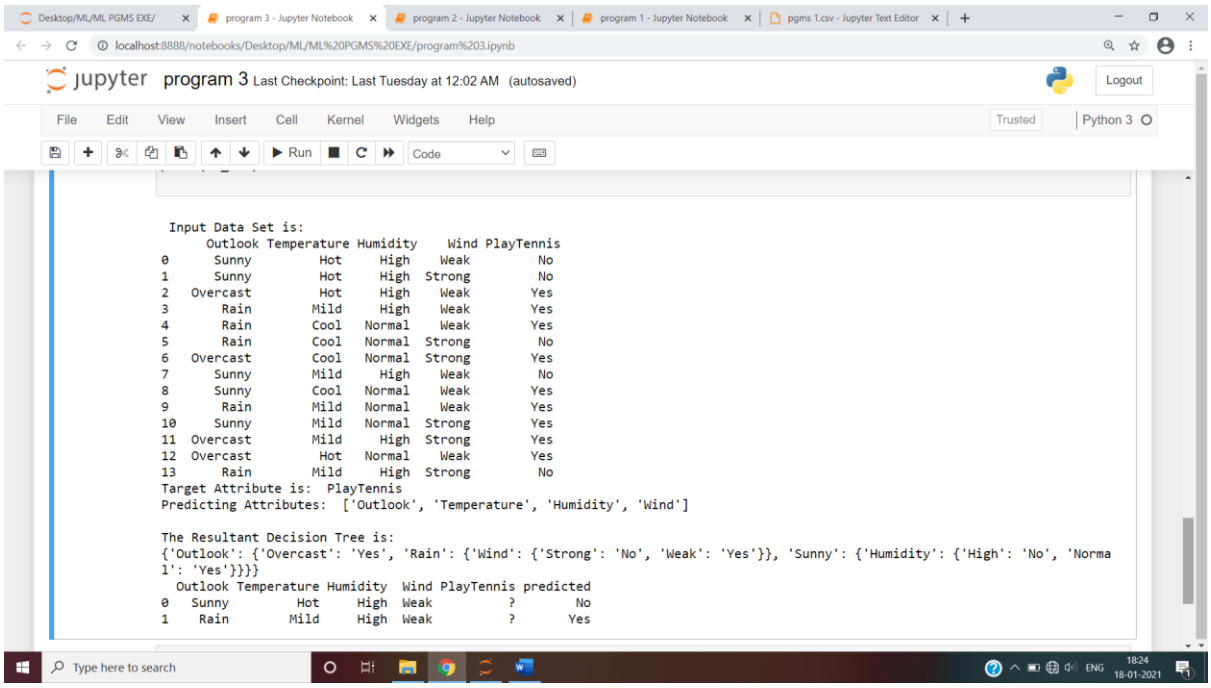
Program1 output



Program2 output

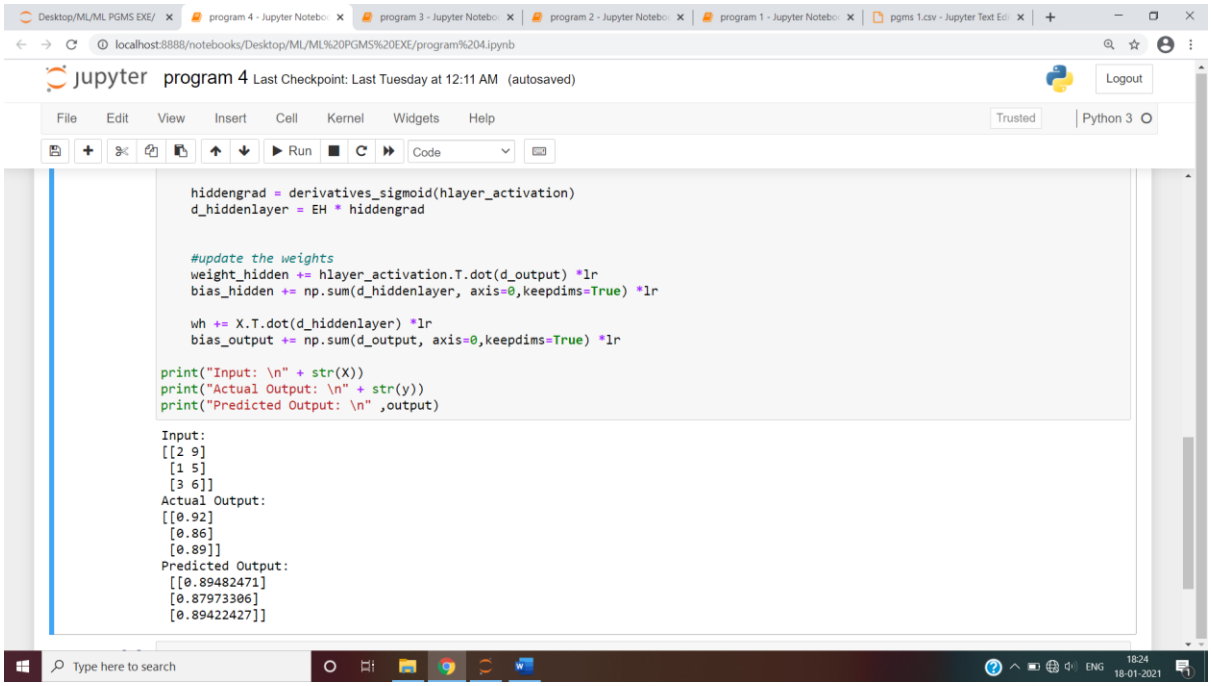


Program3 output



```
 Input Data Set is:
     Outlook Temperature Humidity    Wind PlayTennis
0      Sunny         Hot     High    Weak         No
1      Sunny         Hot     High  Strong         No
2   Overcast         Hot     High    Weak        Yes
3       Rain        Mild     High    Weak        Yes
4       Rain        Cool   Normal    Weak        Yes
5       Rain        Cool   Normal  Strong         No
6   Overcast        Cool   Normal  Strong        Yes
7      Sunny        Mild     High    Weak         No
8      Sunny        Cool   Normal    Weak        Yes
9       Rain        Mild   Normal    Weak        Yes
10     Sunny        Mild   Normal  Strong        Yes
11  Overcast        Mild     High  Strong        Yes
12  Overcast         Hot   Normal    Weak        Yes
13      Rain        Mild     High  Strong         No
Target Attribute is:  PlayTennis
Predicting Attributes:  ['Outlook', 'Temperature', 'Humidity', 'Wind']

The Resultant Decision Tree is:
{'Outlook': {'Overcast': 'Yes', 'Rain': {'Wind': {'Strong': 'No', 'Weak': 'Yes'}}, 'Sunny': {'Humidity': {'High': 'No', 'Norma
l': 'Yes'}}}}
  Outlook Temperature Humidity  Wind PlayTennis predicted
0   Sunny         Hot     High  Weak          ?        No
1    Rain        Mild     High  Weak          ?       Yes
```

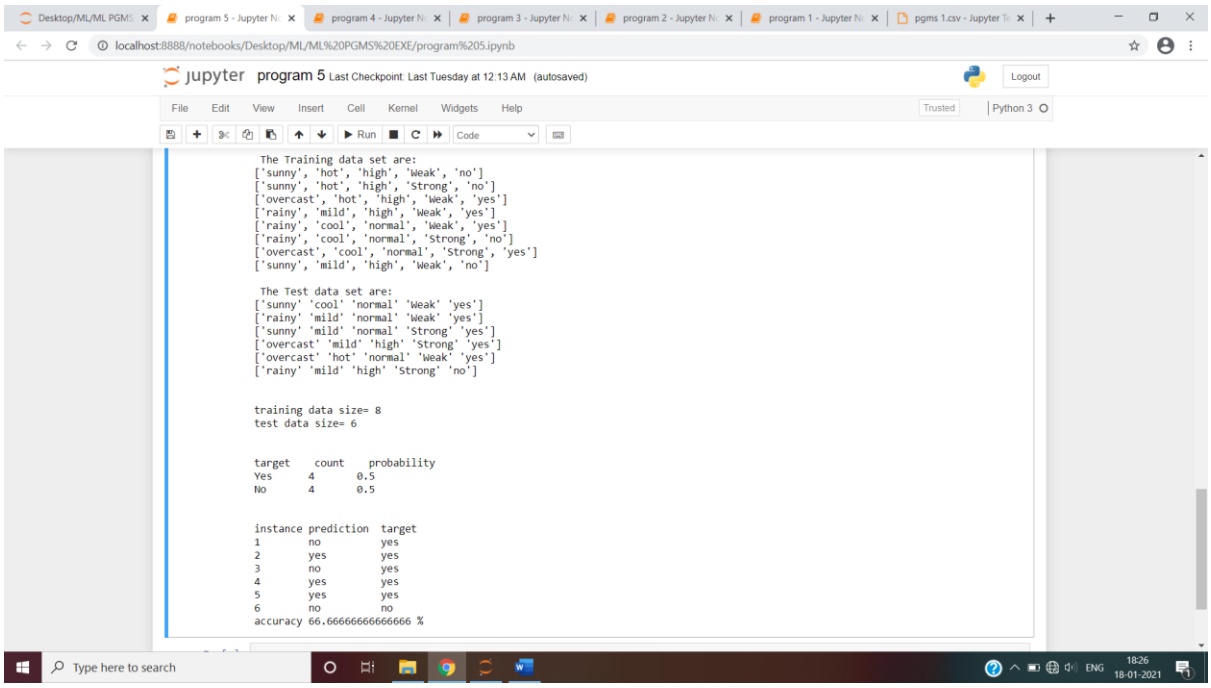
Program4 output



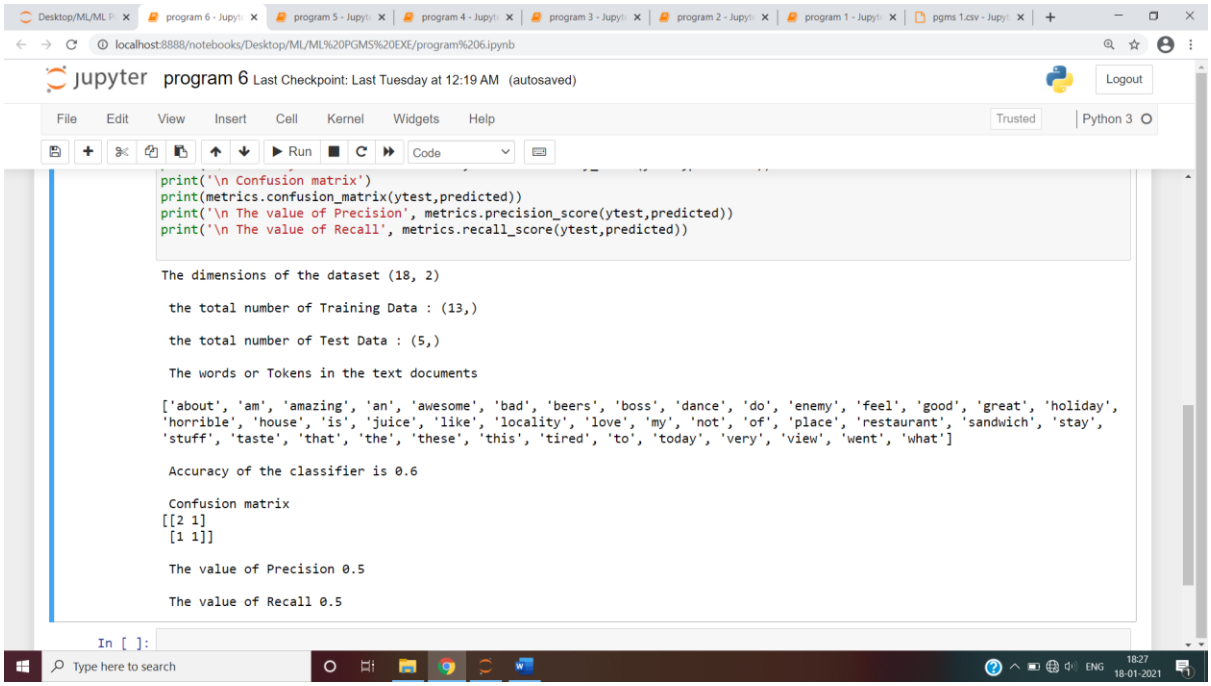
```
    hiddengrad = derivatives_sigmoid(hlayer_activation)
    d_hiddenlayer = EH * hiddengrad


    #update the weights
    weight_hidden += hlayer_activation.T.dot(d_output) *lr
    bias_hidden += np.sum(d_hiddenlayer, axis=0,keepdims=True) *lr

    wh += X.T.dot(d_hiddenlayer) *lr
    bias_output += np.sum(d_output, axis=0,keepdims=True) *lr

print("Input: \n" + str(X))
print("Actual Output: \n" + str(y))
print("Predicted Output: \n" ,output)
```

```
Input:
[[2 9]
 [1 5]
 [3 6]]
Actual Output:
[[0.92]
 [0.86]
 [0.89]]
Predicted Output:
 [[0.89482471]
 [0.87973306]
 [0.89422427]]
```

Program5 output



Program6 output

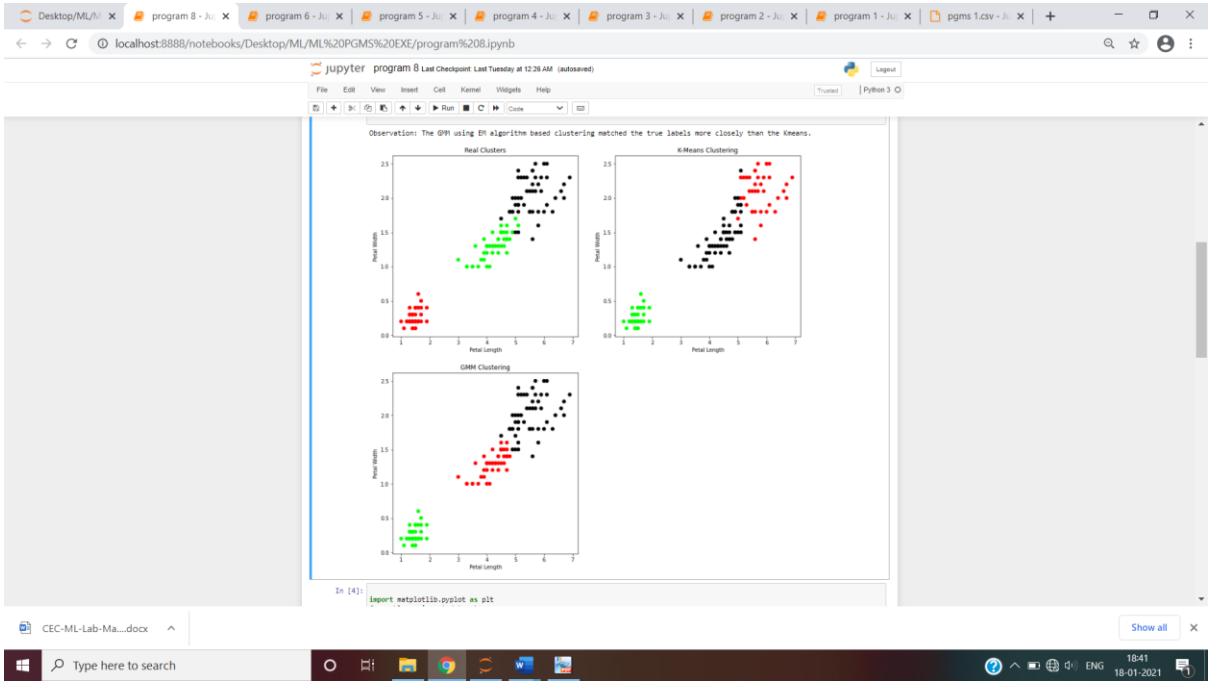


Program7 output

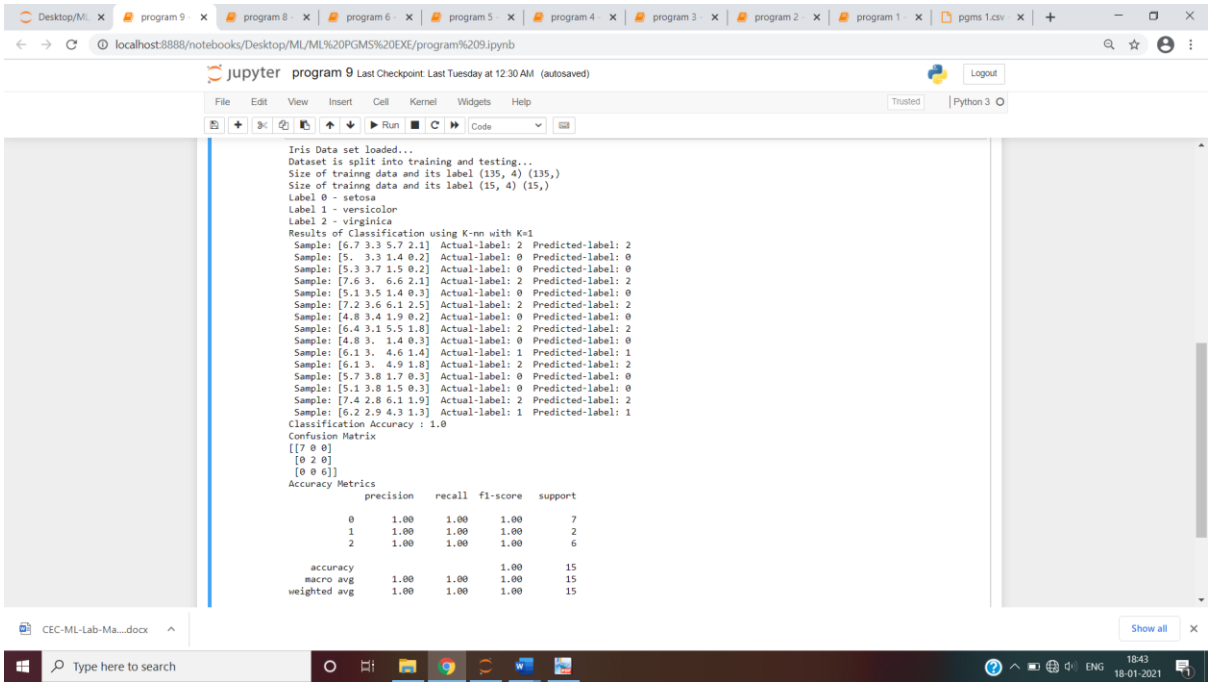
```
Sample instances from the dataset are given below
   age  sex  cp  trestbps  chol  fbs  restecg  thalach  exang  oldpeak  slope  \
0   63    1   1       145   233    1        2      150      0      2.3      3
1   67    1   4       160   286    0        2      108      1      1.5      2
2   67    1   4       120   229    0        2      129      1      2.6      2
3   37    1   3       130   250    0        0      187      0      3.5      3
4   41    0   2       130   204    0        2      172      0      1.4      1

  ca thal  heartdisease
0  0    6             0
1  3    3             2
2  2    7             1
3  0    3             0
4  0    3             0

 Attributes and datatypes
age               int64
sex               int64
cp                int64
trestbps          int64
chol              int64
fbs               int64
restecg           int64
thalach           int64
exang             int64
oldpeak         float64
slope             int64
ca               object
thal             object
heartdisease      int64
dtype: object

 Inferencing with Bayesian Network:

 1.Probability of HeartDisease given evidence=restecg :1
+-----------------+---------------------+
| heartdisease    |   phi(heartdisease) |
+=================+=====================+
| heartdisease(0) |              0.1012 |
+-----------------+---------------------+
| heartdisease(1) |              0.0000 |
+-----------------+---------------------+
| heartdisease(2) |              0.2392 |
+-----------------+---------------------+
| heartdisease(3) |              0.2015 |
+-----------------+---------------------+
| heartdisease(4) |              0.4581 |
+-----------------+---------------------+
```

```
+-----------------+----------------------+
| heartdisease    |   phi(heartdisease)  |
+=================+======================+
| heartdisease(0) |               0.3610 |
+-----------------+----------------------+
| heartdisease(1) |               0.2159 |
+-----------------+----------------------+
| heartdisease(2) |               0.1373 |
+-----------------+----------------------+
| heartdisease(3) |               0.1537 |
+-----------------+----------------------+
| heartdisease(4) |               0.1321 |
+-----------------+----------------------+
```

Program8 output



Program9 output



Program10 output