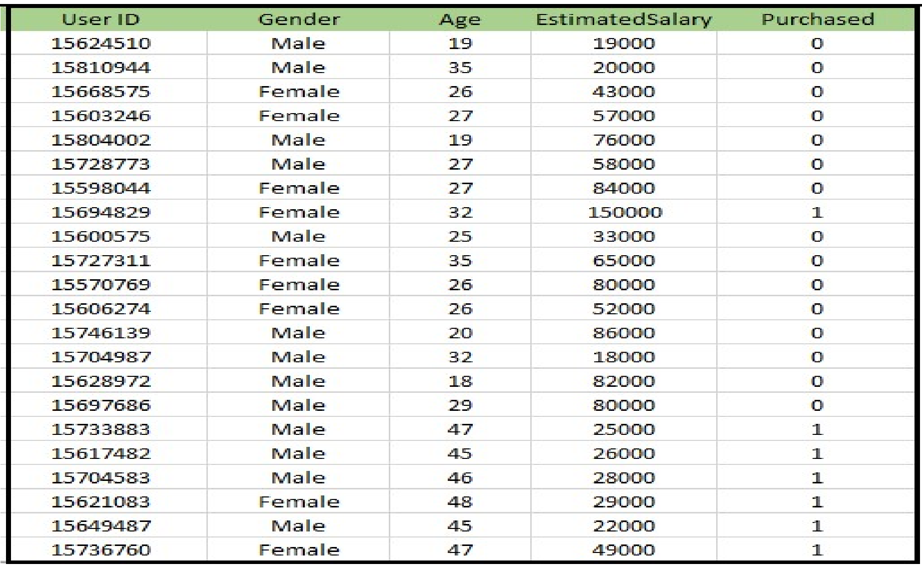
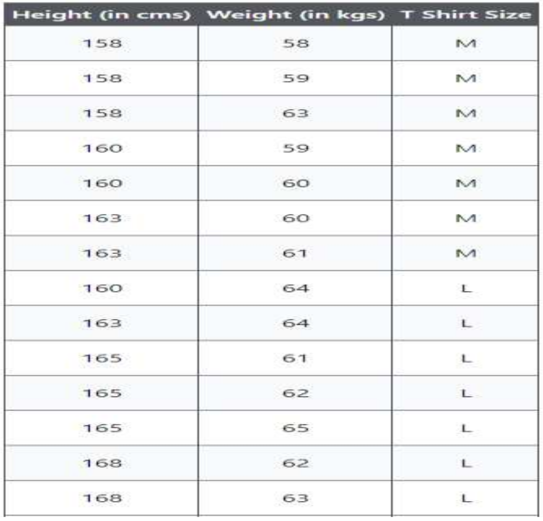
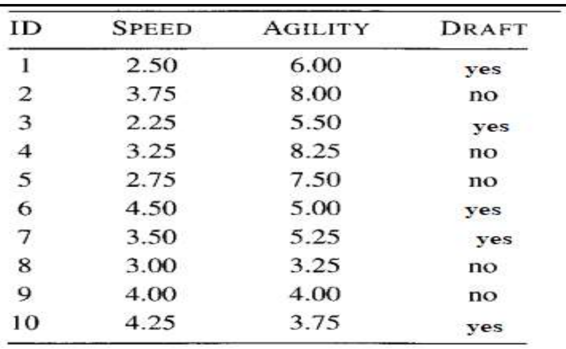
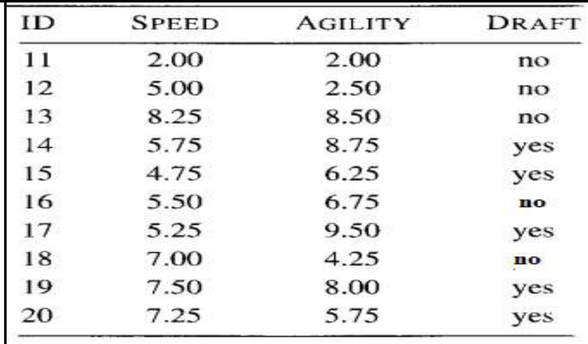
VR Siddhartha Engineering College
Department of Information Technology

20IT6302: MACHINE LEARNING HOME ASSIGNMENT-3 QUESTIONS

<table>
<tr><th>s.no</th><th>QUESTION</th><th>CO</th><th>BTL</th></tr>
<tr><td>1</td><td>

<table>
<tr><th>User ID</th><th>Gender</th><th>Age</th><th>EstimatedSalary</th><th>Purchased</th></tr>
<tr><td>15624510</td><td>Male</td><td>19</td><td>19000</td><td>0</td></tr>
<tr><td>15810944</td><td>Male</td><td>35</td><td>20000</td><td>0</td></tr>
<tr><td>15668575</td><td>Female</td><td>26</td><td>43000</td><td>0</td></tr>
<tr><td>15603246</td><td>Female</td><td>27</td><td>57000</td><td>0</td></tr>
<tr><td>15804002</td><td>Male</td><td>19</td><td>76000</td><td>0</td></tr>
<tr><td>15728773</td><td>Male</td><td>27</td><td>58000</td><td>0</td></tr>
<tr><td>15598044</td><td>Female</td><td>27</td><td>84000</td><td>0</td></tr>
<tr><td>15694829</td><td>Female</td><td>32</td><td>150000</td><td>1</td></tr>
<tr><td>15600575</td><td>Male</td><td>25</td><td>33000</td><td>0</td></tr>
<tr><td>15727311</td><td>Female</td><td>35</td><td>65000</td><td>0</td></tr>
<tr><td>15570769</td><td>Female</td><td>26</td><td>80000</td><td>0</td></tr>
<tr><td>15606274</td><td>Female</td><td>26</td><td>52000</td><td>0</td></tr>
<tr><td>15746139</td><td>Male</td><td>20</td><td>86000</td><td>0</td></tr>
<tr><td>15704987</td><td>Male</td><td>32</td><td>18000</td><td>0</td></tr>
<tr><td>15628972</td><td>Male</td><td>18</td><td>82000</td><td>0</td></tr>
<tr><td>15697686</td><td>Male</td><td>29</td><td>80000</td><td>0</td></tr>
<tr><td>15733883</td><td>Male</td><td>47</td><td>25000</td><td>1</td></tr>
<tr><td>15617482</td><td>Male</td><td>45</td><td>26000</td><td>1</td></tr>
<tr><td>15704583</td><td>Male</td><td>46</td><td>28000</td><td>1</td></tr>
<tr><td>15621083</td><td>Female</td><td>48</td><td>29000</td><td>1</td></tr>
<tr><td>15649487</td><td>Male</td><td>45</td><td>22000</td><td>1</td></tr>
<tr><td>15736760</td><td>Female</td><td>47</td><td>49000</td><td>1</td></tr>
</table>
Check whetehr the customer with features Gender=Male; Age=26; estimated salary=60000 will purchase a car or not.
</td><td>CO2</td><td>Apply</td></tr>
<tr><td>2</td><td>

<table>
<tr><th>Height (in cms)</th><th>Weight (in kgs)</th><th>T Shirt Size</th></tr>
<tr><td>158</td><td>58</td><td>M</td></tr>
<tr><td>158</td><td>59</td><td>M</td></tr>
<tr><td>158</td><td>63</td><td>M</td></tr>
<tr><td>160</td><td>59</td><td>M</td></tr>
<tr><td>160</td><td>60</td><td>M</td></tr>
<tr><td>163</td><td>60</td><td>M</td></tr>
<tr><td>163</td><td>61</td><td>M</td></tr>
<tr><td>160</td><td>64</td><td>L</td></tr>
<tr><td>163</td><td>64</td><td>L</td></tr>
<tr><td>165</td><td>61</td><td>L</td></tr>
<tr><td>165</td><td>62</td><td>L</td></tr>
<tr><td>165</td><td>65</td><td>L</td></tr>
<tr><td>168</td><td>62</td><td>L</td></tr>
<tr><td>168</td><td>63</td><td>L</td></tr>
</table>
Suppose we have height, weight and T-shirt size of some customers. Predict the T-shirt size of a new customer 'Monica' has height 161cm and weight 61kg.
</td><td>CO2</td><td>Apply</td></tr>
</table>

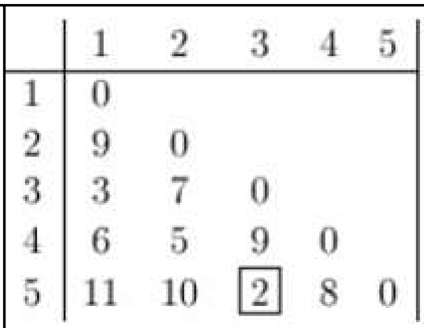
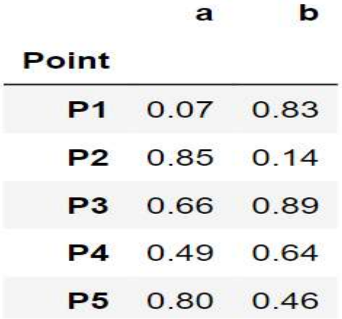
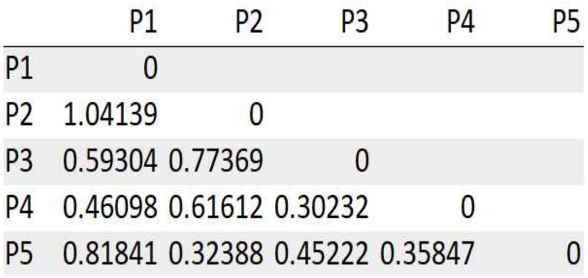
<table>
<tr><td>3</td><td><table><tr><th>ID</th><th>SPEED</th><th>AGILITY</th><th>DRAFT</th></tr><tr><td>1</td><td>2.50</td><td>6.00</td><td>yes</td></tr><tr><td>2</td><td>3.75</td><td>8.00</td><td>no</td></tr><tr><td>3</td><td>2.25</td><td>5.50</td><td>yes</td></tr><tr><td>4</td><td>3.25</td><td>8.25</td><td>no</td></tr><tr><td>5</td><td>2.75</td><td>7.50</td><td>no</td></tr><tr><td>6</td><td>4.50</td><td>5.00</td><td>yes</td></tr><tr><td>7</td><td>3.50</td><td>5.25</td><td>yes</td></tr><tr><td>8</td><td>3.00</td><td>3.25</td><td>no</td></tr><tr><td>9</td><td>4.00</td><td>4.00</td><td>no</td></tr><tr><td>10</td><td>4.25</td><td>3.75</td><td>yes</td></tr></table>The spped and agility of the 10 college athelets along with whether rhaey have drafted or not is given in the above table. Predict whether an athelet with speed=6.75 and agility=3.00 will be drafter or not.</td><td>CO2</td><td>Apply</td></tr>
<tr><td>4</td><td><table><tr><th>ID</th><th>SPEED</th><th>AGILITY</th><th>DRAFT</th></tr><tr><td>11</td><td>2.00</td><td>2.00</td><td>no</td></tr><tr><td>12</td><td>5.00</td><td>2.50</td><td>no</td></tr><tr><td>13</td><td>8.25</td><td>8.50</td><td>no</td></tr><tr><td>14</td><td>5.75</td><td>8.75</td><td>yes</td></tr><tr><td>15</td><td>4.75</td><td>6.25</td><td>yes</td></tr><tr><td>16</td><td>5.50</td><td>6.75</td><td>no</td></tr><tr><td>17</td><td>5.25</td><td>9.50</td><td>yes</td></tr><tr><td>18</td><td>7.00</td><td>4.25</td><td>no</td></tr><tr><td>19</td><td>7.50</td><td>8.00</td><td>yes</td></tr><tr><td>20</td><td>7.25</td><td>5.75</td><td>yes</td></tr></table>The spped and agility of the 10 college athelets along with whether rhaey have drafted or not is given in the above table. Predict whether an athelet with speed=6.75 and agility=3.00 will be drafter or not.</td><td>CO2</td><td>Apply</td></tr>
<tr><td>5</td><td>Cluster the following eight points (with (x, y) representing locations) into three clusters using k-means clustering:

A1(2, 10), A2(2, 5), A3(8, 4), A4(5, 8), A5(7, 5), A6(6, 4), A7(1, 2), A8(4, 9)</td><td>CO2</td><td>Apply</td></tr>
<tr><td>6</td><td>Cluster the following ten points (with (x, y) representing locations) into two clusters using k-means clustering:

A1 (2,10), A2 (2,6), A3 (11,11), A4 (6,9), A5 (6,4), A6 (1,2), A7 (5,10), A8 (4,9), A9 (10,12), A10 (7,5)</td><td>CO2</td><td>Apply</td></tr>
<tr><td>7</td><td>Cluster the following eight points (with (x, y) representing locations) into two clusters using k-means clustering:

A1(2, 10), A2(2, 5), A3(8, 4), A4(5, 8), A5(7, 5), A6(6, 4), A7(1, 2), A8(4, 9)</td><td>CO2</td><td>Apply</td></tr>
<tr><td>8</td><td>Cluster the following ten points (with (x, y) representing locations) into three clusters using k-means clustering:

A1 (2,10), A2 (2,6), A3 (11,11), A4 (6,9), A5 (6,4), A6 (1,2), A7 (5,10), A8 (4,9), A9 (10,12), A10 (7,5)</td><td>CO2</td><td>Apply</td></tr>
</table>

<table>
<tr><td>9</td><td>

<table>
<tr><th></th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th></tr>
<tr><td>1</td><td>0</td><td></td><td></td><td></td><td></td></tr>
<tr><td>2</td><td>9</td><td>0</td><td></td><td></td><td></td></tr>
<tr><td>3</td><td>3</td><td>7</td><td>0</td><td></td><td></td></tr>
<tr><td>4</td><td>6</td><td>5</td><td>9</td><td>0</td><td></td></tr>
<tr><td>5</td><td>11</td><td>10</td><td>$\boxed{2}$</td><td>8</td><td>0</td></tr>
</table>
Draw the dendogram by Performing the agglomerative clustering and find the best number of clusters for the 5 objects with the above distance matrix.
</td><td>CO2</td><td>Apply</td></tr>
<tr><td>10</td><td>

<table>
<tr><th>Point</th><th>a</th><th>b</th></tr>
<tr><td>P1</td><td>0.07</td><td>0.83</td></tr>
<tr><td>P2</td><td>0.85</td><td>0.14</td></tr>
<tr><td>P3</td><td>0.66</td><td>0.89</td></tr>
<tr><td>P4</td><td>0.49</td><td>0.64</td></tr>
<tr><td>P5</td><td>0.80</td><td>0.46</td></tr>
</table>

<table>
<tr><th></th><th>P1</th><th>P2</th><th>P3</th><th>P4</th><th>P5</th></tr>
<tr><td>P1</td><td>0</td><td></td><td></td><td></td><td></td></tr>
<tr><td>P2</td><td>1.04139</td><td>0</td><td></td><td></td><td></td></tr>
<tr><td>P3</td><td>0.59304</td><td>0.77369</td><td>0</td><td></td><td></td></tr>
<tr><td>P4</td><td>0.46098</td><td>0.61612</td><td>0.30232</td><td>0</td><td></td></tr>
<tr><td>P5</td><td>0.81841</td><td>0.32388</td><td>0.45222</td><td>0.35847</td><td>0</td></tr>
</table>
Draw the dendogram by Performing the agglomerative clustering and find the best number of clusters for the 5 objects with the above distance matrix.
</td><td>CO2</td><td>Apply</td></tr>
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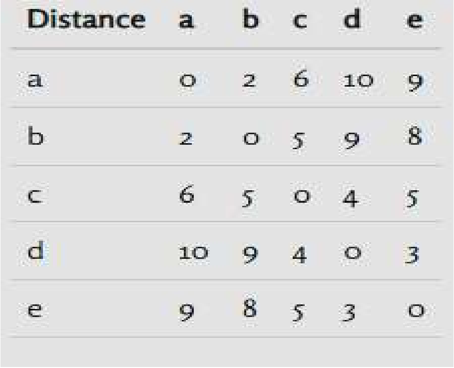
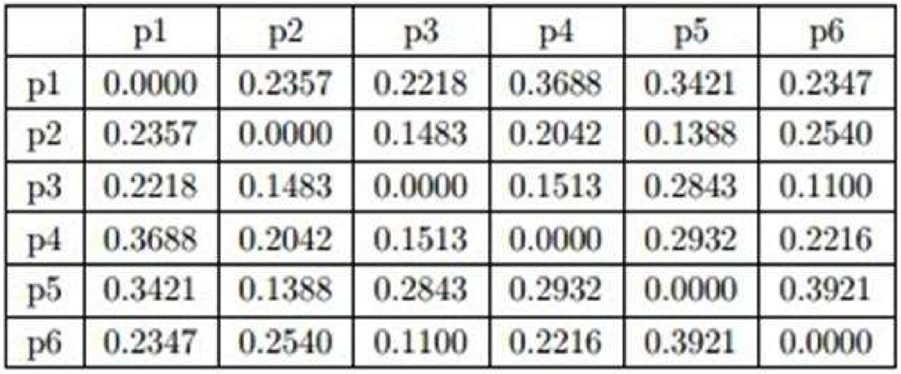

<table>
<tr><th>Distance</th><th>a</th><th>b</th><th>c</th><th>d</th><th>e</th></tr>
<tr><td>a</td><td>0</td><td>2</td><td>6</td><td>10</td><td>9</td></tr>
<tr><td>b</td><td>2</td><td>0</td><td>5</td><td>9</td><td>8</td></tr>
<tr><td>c</td><td>6</td><td>5</td><td>0</td><td>4</td><td>5</td></tr>
<tr><td>d</td><td>10</td><td>9</td><td>4</td><td>0</td><td>3</td></tr>
<tr><td>e</td><td>9</td><td>8</td><td>5</td><td>3</td><td>0</td></tr>
</table>
Draw the dendogram by Performing the agglomerative clustering and find the best number of clusters for the 5 objects with the above distance matrix.
</td><td>CO2</td><td>Apply</td></tr>
<tr><td>12</td><td>

<table>
<tr><th></th><th>p1</th><th>p2</th><th>p3</th><th>p4</th><th>p5</th><th>p6</th></tr>
<tr><td>p1</td><td>0.0000</td><td>0.2357</td><td>0.2218</td><td>0.3688</td><td>0.3421</td><td>0.2347</td></tr>
<tr><td>p2</td><td>0.2357</td><td>0.0000</td><td>0.1483</td><td>0.2042</td><td>0.1388</td><td>0.2540</td></tr>
<tr><td>p3</td><td>0.2218</td><td>0.1483</td><td>0.0000</td><td>0.1513</td><td>0.2843</td><td>0.1100</td></tr>
<tr><td>p4</td><td>0.3688</td><td>0.2042</td><td>0.1513</td><td>0.0000</td><td>0.2932</td><td>0.2216</td></tr>
<tr><td>p5</td><td>0.3421</td><td>0.1388</td><td>0.2843</td><td>0.2932</td><td>0.0000</td><td>0.3921</td></tr>
<tr><td>p6</td><td>0.2347</td><td>0.2540</td><td>0.1100</td><td>0.2216</td><td>0.3921</td><td>0.0000</td></tr>
</table>
Draw the dendogram by Performing the agglomerative clustering and find the best number of clusters for the 5 objects with the above distance matrix.
</td><td>CO2</td><td>Apply</td></tr>
</table>

13

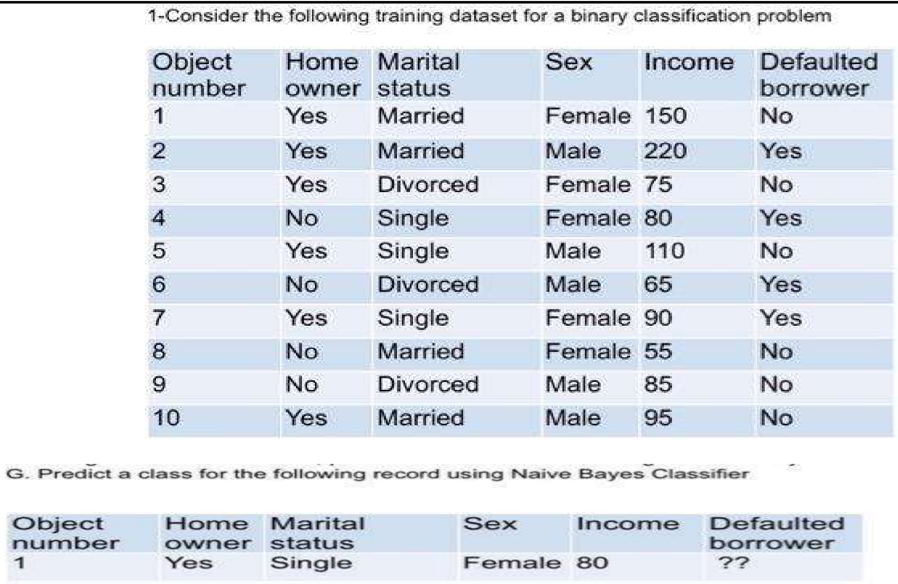
Name	Blood Type	Give Birth	Can Fly	Live in Water	Class
human	warm	yes	no	no	mammals
python	cold	no	no	no	reptiles
salmon	cold	no	no	yes	fishes
whale	warm	yes	no	yes	mammals
frog	cold	no	no	sometimes	amphibians
komodo	cold	no	no	no	reptiles
bat	warm	yes	yes	no	mammals
pigeon	warm	no	yes	no	birds
cat	warm	yes	no	no	mammals
leopard shark	cold	yes	no	yes	fishes
turtle	cold	no	no	sometimes	reptiles
penguin	warm	no	no	sometimes	birds
porcupine	warm	yes	no	no	mammals
eel	cold	no	no	yes	fishes
salamander	cold	no	no	sometimes	amphibians
gila monster	cold	no	no	no	reptiles
platypus	warm	no	no	no	mammals
owl	warm	no	yes	no	birds
dolphin	warm	yes	no	yes	mammals
eagle	warm	no	yes	no	birds

Find the class of species if {blood type=cold, give birth=yes, can fly=yes, live in water=sometimes}

CO3

Apply

14



1-Consider the following training dataset for a binary classification problem

Object number	Home owner	Marital status	Sex	Income	Defaulted borrower
1	Yes	Married	Female	150	No
2	Yes	Married	Male	220	Yes
3	Yes	Divorced	Female	75	No
4	No	Single	Female	80	Yes
5	Yes	Single	Male	110	No
6	No	Divorced	Male	65	Yes
7	Yes	Single	Female	90	Yes
8	No	Married	Female	55	No
9	No	Divorced	Male	85	No
10	Yes	Married	Male	95	No

G. Predict a class for the following record using Naive Bayes Classifier

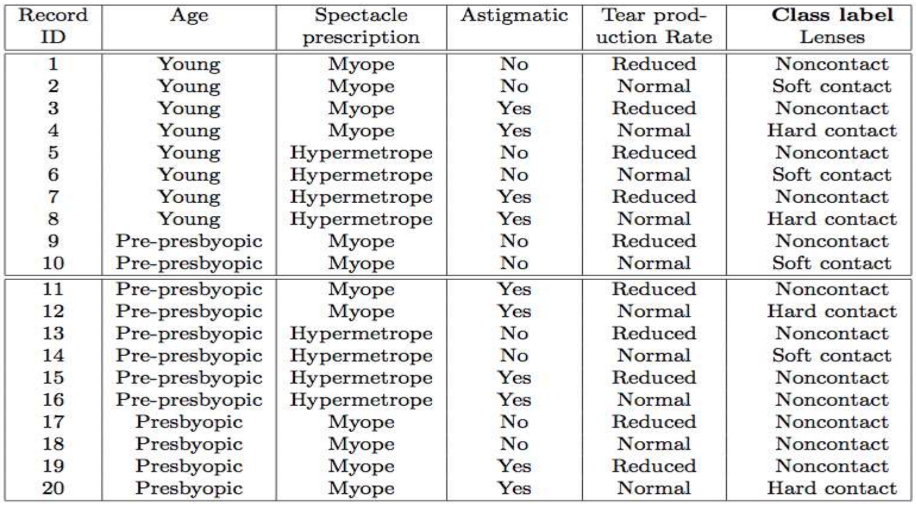
Object number	Home owner	Marital status	Sex	Income	Defaulted borrower
1	Yes	Single	Female	80	??

CO3

Apply

15

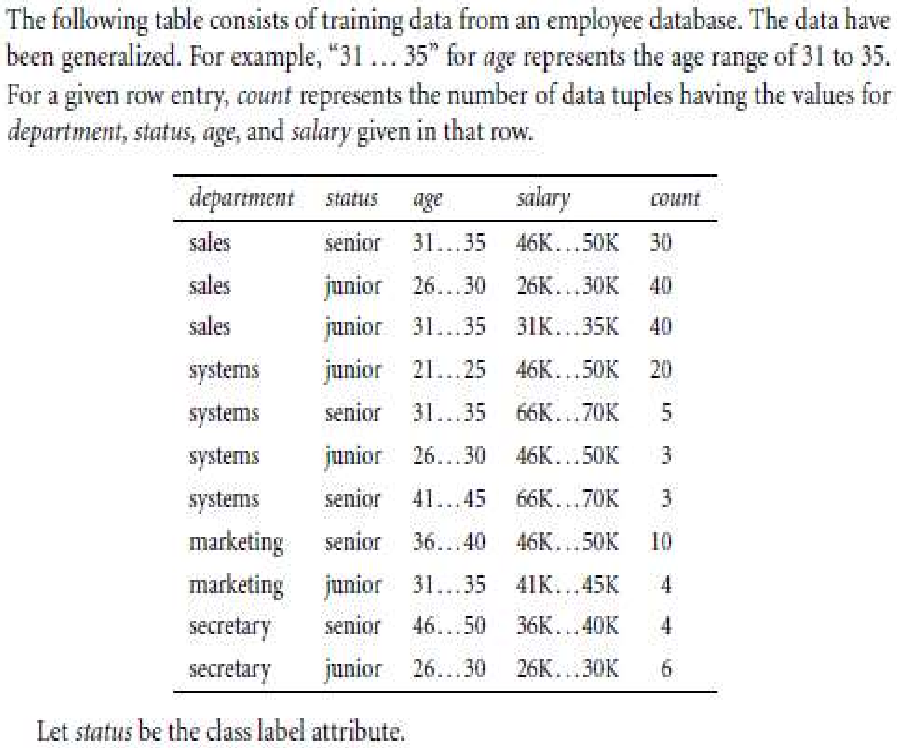
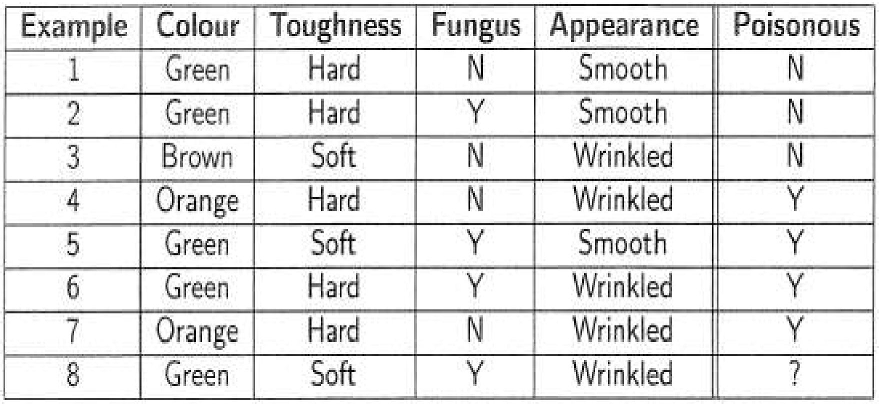
Using naïve Bayesian classification find the class label of the tuple: presbyopic, hypermetrope, yes, normal



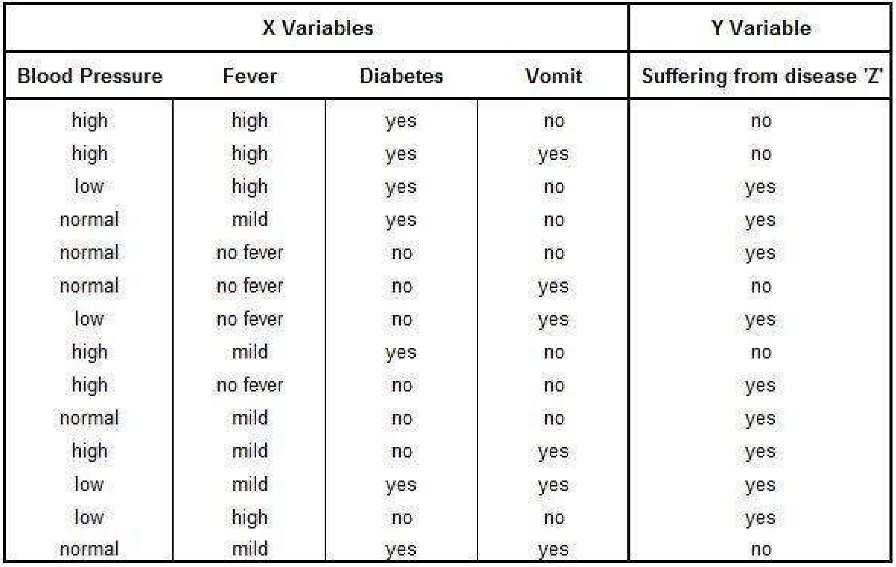
Record ID	Age	Spectacle prescription	Astigmatic	Tear production Rate	**Class label** Lenses
1	Young	Myope	No	Reduced	Noncontact
2	Young	Myope	No	Normal	Soft contact
3	Young	Myope	Yes	Reduced	Noncontact
4	Young	Myope	Yes	Normal	Hard contact
5	Young	Hypermetrope	No	Reduced	Noncontact
6	Young	Hypermetrope	No	Normal	Soft contact
7	Young	Hypermetrope	Yes	Reduced	Noncontact
8	Young	Hypermetrope	Yes	Normal	Hard contact
9	Pre-presbyopic	Myope	No	Reduced	Noncontact
10	Pre-presbyopic	Myope	No	Normal	Soft contact
11	Pre-presbyopic	Myope	Yes	Reduced	Noncontact
12	Pre-presbyopic	Myope	Yes	Normal	Hard contact
13	Pre-presbyopic	Hypermetrope	No	Reduced	Noncontact
14	Pre-presbyopic	Hypermetrope	No	Normal	Soft contact
15	Pre-presbyopic	Hypermetrope	Yes	Reduced	Noncontact
16	Pre-presbyopic	Hypermetrope	Yes	Normal	Noncontact
17	Presbyopic	Myope	No	Reduced	Noncontact
18	Presbyopic	Myope	No	Normal	Noncontact
19	Presbyopic	Myope	Yes	Reduced	Noncontact
20	Presbyopic	Myope	Yes	Normal	Hard contact

CO3

Apply

<table>
<tr>
<td>16</td>
<td>Given a data tuple having the values *“systems,” “26. . . 30,”* and *“46–50K”* for the attributes *department, age*, and *salary*, respectively, what would a na¨ıve Bayesian classification of the *status* for the tuple be?

The following table consists of training data from an employee database. The data have been generalized. For example, “31 … 35” for *age* represents the age range of 31 to 35. For a given row entry, *count* represents the number of data tuples having the values for *department, status, age*, and *salary* given in that row.
<table>
<tr><th>department</th><th>status</th><th>age</th><th>salary</th><th>count</th></tr>
<tr><td>sales</td><td>senior</td><td>31…35</td><td>46K…50K</td><td>30</td></tr>
<tr><td>sales</td><td>junior</td><td>26…30</td><td>26K…30K</td><td>40</td></tr>
<tr><td>sales</td><td>junior</td><td>31…35</td><td>31K…35K</td><td>40</td></tr>
<tr><td>systems</td><td>junior</td><td>21…25</td><td>46K…50K</td><td>20</td></tr>
<tr><td>systems</td><td>senior</td><td>31…35</td><td>66K…70K</td><td>5</td></tr>
<tr><td>systems</td><td>junior</td><td>26…30</td><td>46K…50K</td><td>3</td></tr>
<tr><td>systems</td><td>senior</td><td>41…45</td><td>66K…70K</td><td>3</td></tr>
<tr><td>marketing</td><td>senior</td><td>36…40</td><td>46K…50K</td><td>10</td></tr>
<tr><td>marketing</td><td>junior</td><td>31…35</td><td>41K…45K</td><td>4</td></tr>
<tr><td>secretary</td><td>senior</td><td>46…50</td><td>36K…40K</td><td>4</td></tr>
<tr><td>secretary</td><td>junior</td><td>26…30</td><td>26K…30K</td><td>6</td></tr>
</table>
Let *status* be the class label attribute.</td>
<td>CO3</td>
<td>Apply</td>
</tr>
<tr>
<td>17</td>
<td>Use Naïve Bayesian classification to predict label of the 8th tuple.

<table>
<tr><th>Example</th><th>Colour</th><th>Toughness</th><th>Fungus</th><th>Appearance</th><th>Poisonous</th></tr>
<tr><td>1</td><td>Green</td><td>Hard</td><td>N</td><td>Smooth</td><td>N</td></tr>
<tr><td>2</td><td>Green</td><td>Hard</td><td>Y</td><td>Smooth</td><td>N</td></tr>
<tr><td>3</td><td>Brown</td><td>Soft</td><td>N</td><td>Wrinkled</td><td>N</td></tr>
<tr><td>4</td><td>Orange</td><td>Hard</td><td>N</td><td>Wrinkled</td><td>Y</td></tr>
<tr><td>5</td><td>Green</td><td>Soft</td><td>Y</td><td>Smooth</td><td>Y</td></tr>
<tr><td>6</td><td>Green</td><td>Hard</td><td>Y</td><td>Wrinkled</td><td>Y</td></tr>
<tr><td>7</td><td>Orange</td><td>Hard</td><td>N</td><td>Wrinkled</td><td>Y</td></tr>
<tr><td>8</td><td>Green</td><td>Soft</td><td>Y</td><td>Wrinkled</td><td>?</td></tr>
</table></td>
<td>CO3</td>
<td>Apply</td>
</tr>
</table>

18



X Variables				Y Variable
Blood Pressure	Fever	Diabetes	Vomit	Suffering from disease 'Z'
high	high	yes	no	no
high	high	yes	yes	no
low	high	yes	no	yes
normal	mild	yes	no	yes
normal	no fever	no	no	yes
normal	no fever	no	yes	no
low	no fever	no	yes	yes
high	mild	yes	no	no
high	no fever	no	no	yes
normal	mild	no	no	yes
high	mild	no	yes	yes
low	mild	yes	yes	yes
low	high	no	no	yes
normal	mild	yes	yes	no

Low no fever yes yes ?

Use naïve Bayesian classification for the above label prediction.

CO3

Apply

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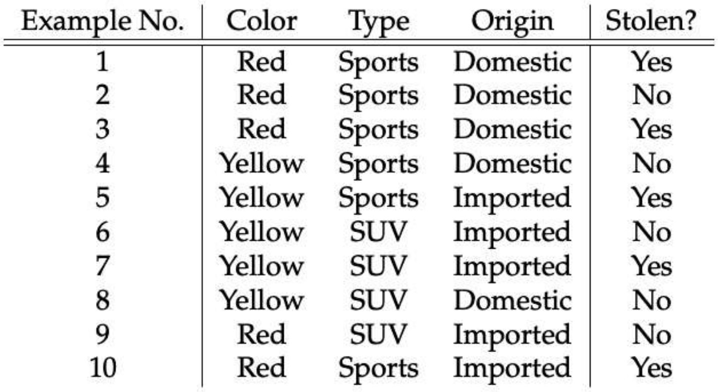


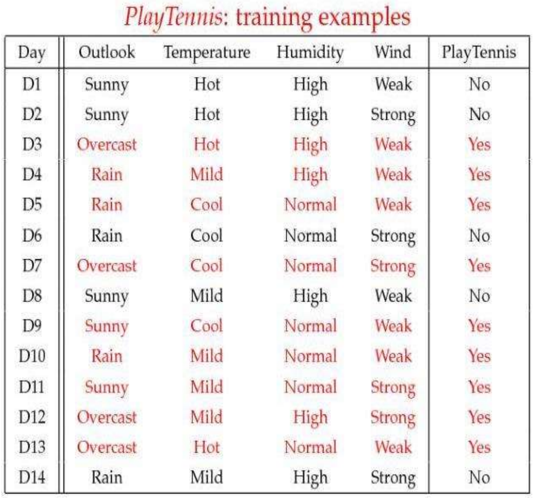
Example No.	Color	Type	Origin	Stolen?
1	Red	Sports	Domestic	Yes
2	Red	Sports	Domestic	No
3	Red	Sports	Domestic	Yes
4	Yellow	Sports	Domestic	No
5	Yellow	Sports	Imported	Yes
6	Yellow	SUV	Imported	No
7	Yellow	SUV	Imported	Yes
8	Yellow	SUV	Domestic	No
9	Red	SUV	Imported	No
10	Red	Sports	Imported	Yes

Use Naïve Baysian classification for predicting the class label of the instance {color=red, Type=SUV, origin=domestic}

CO3

Apply

20



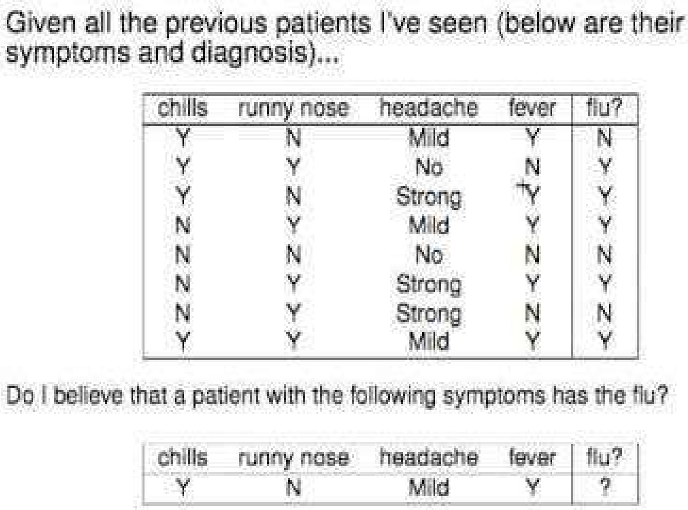
PlayTennis: training examples

Day	Outlook	Temperature	Humidity	Wind	PlayTennis
D1	Sunny	Hot	High	Weak	No
D2	Sunny	Hot	High	Strong	No
D3	Overcast	Hot	High	Weak	Yes
D4	Rain	Mild	High	Weak	Yes
D5	Rain	Cool	Normal	Weak	Yes
D6	Rain	Cool	Normal	Strong	No
D7	Overcast	Cool	Normal	Strong	Yes
D8	Sunny	Mild	High	Weak	No
D9	Sunny	Cool	Normal	Weak	Yes
D10	Rain	Mild	Normal	Weak	Yes
D11	Sunny	Mild	Normal	Strong	Yes
D12	Overcast	Mild	High	Strong	Yes
D13	Overcast	Hot	Normal	Weak	Yes
D14	Rain	Mild	High	Strong	No

Use Naïve Baysian classification for predicting the class label of the instance {outlook=rainy, temarature=cool, humidity= high, wind=strong.}

CO3

Apply

<table>
<tr>
<td>21</td>
<td>


Given all the previous patients I've seen (below are their symptoms and diagnosis)...

<table>
<tr><th>chills</th><th>runny nose</th><th>headache</th><th>fever</th><th>flu?</th></tr>
<tr><td>Y</td><td>N</td><td>Mild</td><td>Y</td><td>N</td></tr>
<tr><td>Y</td><td>Y</td><td>No</td><td>N</td><td>Y</td></tr>
<tr><td>Y</td><td>N</td><td>Strong</td><td>Y</td><td>Y</td></tr>
<tr><td>N</td><td>Y</td><td>Mild</td><td>Y</td><td>Y</td></tr>
<tr><td>N</td><td>N</td><td>No</td><td>N</td><td>N</td></tr>
<tr><td>N</td><td>Y</td><td>Strong</td><td>Y</td><td>Y</td></tr>
<tr><td>N</td><td>Y</td><td>Strong</td><td>N</td><td>N</td></tr>
<tr><td>Y</td><td>Y</td><td>Mild</td><td>Y</td><td>Y</td></tr>
</table>

Do I believe that a patient with the following symptoms has the flu?

<table>
<tr><th>chills</th><th>runny nose</th><th>headache</th><th>fever</th><th>flu?</th></tr>
<tr><td>Y</td><td>N</td><td>Mild</td><td>Y</td><td>?</td></tr>
</table>
</td>
<td>CO3</td>
<td>Apply</td>
</tr>
<tr>
<td>22</td>
<td>
Apply the Naïve Bayes classifier for the following <i>Pie dataset</i> in order to determine the class of the following object.

x = [crust-size=thick, crust-shade=gray, filling-size=thin, filling shade=white, shape=square]

<table>
<tr><th colspan="7"><i>Pie Dataset</i></th></tr>
<tr><th rowspan="2">Example</th><th colspan="2">Crust</th><th colspan="2">Filling</th><th rowspan="2">Shape</th><th rowspan="2">Class</th></tr>
<tr><th>Size</th><th>Shade</th><th>Size</th><th>Shade</th></tr>
<tr><td>Ex1</td><td>Thick</td><td>Gray</td><td>Thick</td><td>Dark</td><td>circle</td><td>positive</td></tr>
<tr><td>Ex2</td><td>Thick</td><td>White</td><td>Thick</td><td>Dark</td><td>circle</td><td>positive</td></tr>
<tr><td>Ex3</td><td>Thick</td><td>Dark</td><td>Thick</td><td>Gray</td><td>triangle</td><td>positive</td></tr>
<tr><td>Ex4</td><td>Thin</td><td>White</td><td>Thin</td><td>Dark</td><td>circle</td><td>positive</td></tr>
<tr><td>Ex5</td><td>Thick</td><td>Dark</td><td>Thin</td><td>White</td><td>square</td><td>positive</td></tr>
<tr><td>Ex6</td><td>Thick</td><td>White</td><td>Thin</td><td>Dark</td><td>circle</td><td>positive</td></tr>
<tr><td>Ex7</td><td>Thick</td><td>Gray</td><td>Thick</td><td>White</td><td>circle</td><td>negative</td></tr>
<tr><td>Ex8</td><td>Thick</td><td>White</td><td>Thick</td><td>Gray</td><td>square</td><td>negative</td></tr>
<tr><td>Ex9</td><td>Thin</td><td>Gray</td><td>Thin</td><td>Dark</td><td>triangle</td><td>negative</td></tr>
<tr><td>Ex10</td><td>Thick</td><td>Dark</td><td>Thick</td><td>White</td><td>circle</td><td>negative</td></tr>
<tr><td>Ex11</td><td>Thick</td><td>White</td><td>Thick</td><td>Dark</td><td>square</td><td>negative</td></tr>
<tr><td>Ex12</td><td>Thick</td><td>White</td><td>Thick</td><td>Gray</td><td>triangle</td><td>negative</td></tr>
</table>
</td>
<td>CO3</td>
<td>Apply</td>
</tr>
<tr>
<td>23</td>
<td>


Consider the training examples shown in the following table for a binary classification. The table shows a training set for a problem of predicting whether a loan applicant will repay his/her loan obligation or defaulting on his/her loan.

<table>
<tr><th><i>Tid</i></th><th>Home Owner</th><th>Marital Status</th><th>Annual Income</th><th>Defaulted Borrower</th></tr>
<tr><td>1</td><td>Yes</td><td>Single</td><td>125K</td><td>No</td></tr>
<tr><td>2</td><td>No</td><td>Married</td><td>100K</td><td>No</td></tr>
<tr><td>3</td><td>No</td><td>Single</td><td>70K</td><td>No</td></tr>
<tr><td>4</td><td>Yes</td><td>Married</td><td>120K</td><td>No</td></tr>
<tr><td>5</td><td>No</td><td>Divorced</td><td>95K</td><td>Yes</td></tr>
<tr><td>6</td><td>No</td><td>Married</td><td>60K</td><td>No</td></tr>
<tr><td>7</td><td>Yes</td><td>Divorced</td><td>220K</td><td>No</td></tr>
<tr><td>8</td><td>No</td><td>Single</td><td>85K</td><td>Yes</td></tr>
<tr><td>9</td><td>No</td><td>Married</td><td>75K</td><td>No</td></tr>
<tr><td>10</td><td>No</td><td>Single</td><td>90K</td><td>Yes</td></tr>
</table>

Using the NB approach that we discussed in the class, predict the class label for this test example, X = (Home Owner = No, Marital Status = Married, Income = $120K).
</td>
<td>CO3</td>
<td>Apply</td>
</tr>
</table>