BRAC UNIVERSITY
Department of Computer Science and Engineering CSE 422: Artificial Intelligence

Assignment 3

Question 1

P(Study^Cheat ^Pass)	Study		~Study	
	Cheat	~Cheat	Cheat	~Cheat
Pass	.25	.15	.10	.13
~Pass	.02	.03	.22	.10

a) **Compute** whether cheat and pass conditionally independent given study. Show all calculations.
b) **Compute** P(Pass or Cheat).

Question 2

P(Cold^Cloudy ^Rain)	Cloudy		~Cloudy	
	Rain	~Rain	Rain	~Rain
Cold	.32	.06	.26	.03
~Cold	.12	.04	.10	.07

a) **Compute** the marginal probability of ~Cold.
b) **Compute** the probability of not cloudy given the it is not raining and the weather being not cold
c) **Compute** the probability of not raining given it is not cloudy.
d) **Compute** P(~Rain or cloudy)

Question 3

	Left-Handed	Right-Handed
Cricket	.24	.1
Football	.15	.1
Other	.15	.26

a) **Compute** the probability of playing football for a left-handed person
b) If someone plays Cricket, **estimate** the probability of being right-handed
c) **Compute** the probability of playing Football and Cricket
d) **Compute** the probability of being right-handed or left-handed
e) **Infer** whether playing football depends on being Right-Handed

Assignment 4

Question 4

A Lie detector machine can correctly detect 96% of the time if a person tells a lie and correctly detect 95% of the time if a person tells a truth. In a jury board, the probability of a person telling a lie is 2%. Now, the lie detector machine declares that a person has told a lie.

a) What is more likely, the person is a liar or not? **Apply** proper theorem and show full calculation.
b) What is the probability of the person not being a liar? **Apply** proper theorem and show calculation

Question 5

What is the problem of Bayes theorem and how does Naive Bayes solve it? **Construct** a dataset to provide an example and explain.

Question 6

SL	Outlook	Humidity	Temp	Wind	Play Tennis
1	Overcast	Cool	Normal	TRUE	Yes
2	Sunny	Mild	High	FALSE	No
3	Sunny	Cool	Normal	FALSE	Yes
4	Rainy	Mild	Normal	FALSE	Yes
5	Sunny	Mild	High	FALSE	No
6	Overcast	Mild	High	TRUE	Yes
7	Sunny	Hot	High	TRUE	No
8	Sunny	Mild	Normal	TRUE	Yes

a) Is a player going to play tennis given the outlook is Sunny, humidity is Mild, temperature is Normal, and the weather is windy? **Apply** Naive Bayes and show proper calculations with the learning phase.
b) Is the player going to play tennis if the outlook is overcast, humidity is hot instead? **Show** full calculation,

Question 7

Color	*Size*	*Shape*	*Edible*
Yellow	Small	Round	Yes
Yellow	Small	Round	No
Green	Small	Irregular	Yes
Green	Large	Irregular	No
Yellow	Large	Round	Yes
Yellow	Small	Round	Yes
Yellow	Small	Round	Yes
Yellow	Small	Round	Yes
Green	Small	Round	No
Yellow	Large	Round	No
Yellow	Large	Round	Yes
Yellow	Large	Round	No
Yellow	Large	Round	No
Yellow	Large	Round	No
Yellow	Small	Irregular	Yes
Yellow	Large	Irregular	Yes

a) Considering 'Edible' as the class, **Compute** entropy for this dataset.

b) Between Color, Size, and Shape, which one is the better feature? **Show** full calculation and **explain**.