BRAC UNIVERSITY
Department of Computer Science and Engineering
CSE 422: Artificial Intelligence
Assignment -03

Question-01

Covid	Diagnosed	Fever
Yes	Yes	Yes
Yes	Yes	No
Yes	No	Yes
Yes	No	No
No	Yes	Yes
No	Yes	No
No	No	Yes
No	No	No
Yes	Yes	Yes
Yes	Yes	No
Yes	No	Yes
Yes	No	No

a) From the given dataset generate a Joint Probability Distribution Table
b)From the Joint Probability Distribution table generated in (a), find the probability that a patient has covid but no fever given the patient is diagnosed with as covid positive.
c)From the Joint Probability Distribution table generated in (a), find the probability that a patient has fever given the patient is diagnosed as positive and is covid positive.

Question-02

Wizarding Pet	Weight (Kg)	House Color	Magical Companion?
Hippogriff	9	Black	No
Kneazle	8	Orange	Yes
Hippogriff	15	White	No
Hippogriff	13	Orange	Yes
Owl	11	White	Yes
Owl	5	White	Yes
Hippogriff	9	Black	No
Kneazle	11	Orange	No
Kneazle	12	Black	Yes
Owl	6	White	Yes

In the wizarding world, magical creatures are considered heavy if they weigh more than 10kg. Now, answer the following questions:

a) Is Hippogriff conditionally independent of being heavy given it is white? Show full calculation.

b) Given a heavy-weighted orange Kneazle, is it more likely to be a magical companion or not? Apply the Naïve Bayes theorem to solve it. (No need to show the learning phase.)

Question-03

Consider two medical tests, RapidTest and AccuScan, for detecting a virus. RapidTest is 95% effective at correctly identifying the virus when it is present (true positive rate), but has a 10% false positive rate (indicating the virus is present when it is not). AccuScan is 90% effective at correctly identifying the virus when it is present, but has a 5% false positive rate. Both tests use independent methods to detect the virus. The virus is present in 1% of the population. If a person tests positive using only one of these tests, which test result is more reliable in indicating that the person actually carries the virus? Justify your answer mathematically.

Question-04

a. A patient went to the hospital for a malaria test. The doctors informed him that their test can successfully diagnose malaria positive given the patient is actually malaria positive 94% of the time. Also, the probability of having no malaria and getting a malaria positive test result is 3%. Meanwhile, 29% of people in general who come for tests are malaria positive. Now if the patient is already diagnosed malaria positive, then calculate the probability of the patient actually being malaria negative.

b. Is being malaria positive and having a negative test result independent of each other? Show calculation and figure out using the information from question A. (Keep two digits after the decimal point of the final score)