BRAC University
Department of Computer Science and Engineering

CSE 422: Artificial Intelligence (C)

Quiz 05: Spring 2025 Time: 30 Minutes Marks: 10

Name		ID		Section	

1. A public health researcher is studying the relationship between exercise, diet, and blood pressure in adults. From a survey of 1,000 individuals, it was found that 600 people exercise regularly. Among those who exercise, 400 also eat a healthy diet. Of the 400 people who do not exercise, only 100 report having a healthy diet. Regarding health outcomes, 150 individuals who both exercise and eat healthy have high blood pressure. In contrast, 80 people who exercise but do not eat healthy, 120 people who don't exercise but do eat healthy, and 200 people who neither exercise nor eat healthy also have high blood pressure. [2.5×4=10]

   (a) Estimate the following probabilities:

      i. $P(\text{Exercise} = \text{yes})$

      ii. $P(\text{HealthyDiet} = \text{yes} \mid \text{Exercise} = \text{yes})$

      iii. $P(\text{HighBP} = \text{yes} \mid \text{Exercise} = \text{yes}, \text{HealthyDiet} = \text{yes})$

   (b) Use the chain rule to compute:

   $$P(\text{Exercise} = \text{yes}, \text{HealthyDiet} = \text{yes}, \text{HighBP} = \text{yes})$$

   (c) Compute the marginal probability:

   $$P(\text{HighBP} = \text{yes})$$

   (d) Does high blood pressure appear to be conditionally independent of exercise given diet? Justify your answer using conditional probabilities.